

CLASSIFICATION OF PTERIDOPHYTA

(GIFFORD & FOSTER 1989)

Pteridophytes are non-flowering vascular plants - referred as vascular cryptogams - which reproduce by spores rather than by seeds.

SALIENT FEATURES OF PTERIDOPHYTES:-

Salient features of Pteridophyta include :-

1. Plant body represents the sporophytic plant body. In the life cycle both the sporophyte & the gametophyte occur as independent generations.
2. Presence of vascular tissue - xylem & phloem - hence are also known as vascular cryptogams. Stele protostelic to complex selenostele & dictyostele.
3. Sporophytic plant body bears stem, leaves & roots (except in few members.)
4. Sporophytes homosporous are heterosporous. In heterosporous condition microsporangia bears microspores, megasporangia bears megaspores.
5. Sporangial development may be eusporangiate (from a group of initials) or leptosporangiate (from a single cell).

CLASSIFICATION :-

Ernest M. Gifford (University of California, Davis) & Adriance E. Foster (UC, Berkeley) in their book "Morphology & Evolution of Vascular Plants (3rd Edition) (1989) classified all vascular plants into fifteen divisions (1-7 - Pteridophytes) (8-14 - Gymnosperms) (15 - Magnoliophyta).

of Pteridophytes

The outline classification by Gifford & Foster includes 7 divisions:

1. Rhyniophyta
2. Zosterophyllophyta
3. Trimerophytrophyta
4. Psilophyta
5. Lycophyta
6. Sphenophyta
7. Filicophyta.

The salient features of the different divisions of Pteridophyte are discussed below :-

I. RHYNIOPHYTA

1. Geological Age :- Lower Devonian (all members are fossil specimen)
2. Structure of Sporophyte :- i) Presence of dichotomously branched aerial axis, presence of horizontal rhizome.
ii) Leafless, rootless, bears rhizoids.
3. Sporangial structure :- Presence of terminal sporangia, homosporous,
4. Nature of stele :- Stele is centarch, protostelic in nature.
5. Example :- Rhynia gwynne-vaughanii

II. ZOSTEROPHYLLOPHYTA :-

1. Geological age :- Lower Devonian. (All members are extinct, no living members exists).
2. Sporophyte structure :- Leafless/ presence of enations, dichotomously forked or pseudomonopodially forked. True leaves & root absent. Rhizoids present.
3. Sporangial structure :- Sporangia lateral, homosporous.
4. Nature of stele :- Solid exarch, protostelic in nature.
5. Example :- Zosterophyllum myretonium

III. TRIMEROPHYTOPHYTA.

1. Geological age :- Lower Devonian to Upper Devonian (All members are extinct, no living members exist).
2. Sporophyte structure :-
 - a) Main plant body smooth or spiny with enations
 - b) Main axis branched spirally/dichotomously
 - c) Lateral branches forked into three units/ or dichotomously
3. Sporangial structure :-
 - a) Fertile branches much forked, terminated by a mass of paired sporangia.
 - b) Sporangia fusiform to elliptic; homosporous.
4. Nature of stele :- Solid, protostelic, centarch to mesarch.
5. Example :- Psilophyton robustus

Evolutionary Significance :-

- a) Proposed to be originated from Rhyniophyta.
- b) Proposed to have given rise to Sphenopsida, Progymnosperms - and other groups of vascular plants.

IV. LYCOPHYTA

1. Geological Age :- Lower Devonian to present day (Both fossil & living members present).
2. Sporophyte structure :-
 - a) Sporophytic plant body differentiated into root, stem & leaves.
 - b) Dichotomously branched.
 - c) Leaves usually small microphyllous, spirally or whorled to opposite.
 - d) Leaves ligulate or eligulate.
3. Sporangial structure :-
 - a) Sporangia are borne singly on the adaxial surface of sporophyll.
 - b) Sporophylls may be / may not be organised into strobili.
 - c) Spores may be of one type (homosporous) or of two types (heterosporous) with microsporangia with microspores & megasporangia with megaspores.
4. Nature of stele :- Protostele, xylem exarch
5. Example :- Lepidodendron (Fossil)
Lycopodium (Living)

V. PSILOPHYTA

1. Geological Age:- Living. No fossil evidence so ^{age of} origin not known.
2. Sporophyte structure:-
 - a) Rootless sporophyte, differentiated into subterranean rhizome & an aerial ^{erect} shoot.
 - b) Branching dichotomous.
 - c) Spirally arranged scale like or leaf like appendages present.
3. Sporangial structure:-
 - a) Biseriate locular sporangia are borne in the axil of leaf like appendages.
 - b) Sporangia development is eusporangiate type, spores homosporous.
4. Nature of stele:- Protostelic or siphostelic in nature. Presence of sclerenchymatous pith.
5. Example:- Psilotum nudum.

VI. SPHENOPHYTA

1. Geological Age:- Devonian to present (Both fossil & living members are present).
2. Sporophyte structure:-
 - a) Living or extinct plants with sporophyte differentiated into stem, leaf, root & eusporangium.
 - b) Stems & branches are jointed with nodes & internodes, internodes with ridges & furrows.
 - c) Leaves microphyllous, reduced & borne in whorls at nodes.

3. Sporangial structure :- a) Sporangia develop on peltate sporangiophore arranged in cone/strobile.
b) Most members homosporous, some extinct forms were heterosporous.

4. Nature of Stele :- a) Stem protostelic or siphonostelic.
b) Xylem exarch or endarch,

5. Example :- Equisetum (Living) Calamites (Fossil).

VII. FILICOPHYTA

1. Geological Age :- Devonian to present.

2. Sporophyte structure :- a) Sporophyte differentiated into stem, leaf & roots. Young leaves show circinate vernation.
b) Leaves macrophyllous, with petiole & a dissected leaf blade with rachis.
c) Each leaf bears sporangia along the margin on abaxial surface.

3. Sporangial structure :- a) Sporangia in sorus, at the tip or margin of pinnule or on abaxial surface of fronds.
b) Sporangia made to be covered by indusium.
c) Generally members homosporous, spores germinate to form heart shaped green gametophyte.

4. Stelar structure :- a) Ranges from protostele, siphonostele, solenostele, dichlostele & polycyclic stele.

5. Example :- Pteris, Oxypterus,