

General account of Pteridophytes :-

Pteridophytes are vascular cryptogams. The division Pteridophyta comprises a large group of autophytic green plants. The Pteridophytes occupy an intermediate place between Bryophytes and Spermatophytes (Gymnosperms). They represent affinities with both the groups. Pteridophytes include plants which are commonly called ferns, club mosses, horsetail etc. which are widely distributed both in tropical and temperate regions of the world.

Characters of Pteridophytes resembling Bryophytes :-

- i. Water is indispensable for the process of fertilization in both the groups.
- ii. Male gametes are flagellated.
- iii. Sex organs (i.e. antheridia and archegonia) are surrounded by sterile jackets.
- iv. Both the groups have definite alternation of sporophytic and gametophytic generations.
- v. The origin and formation of spores from sporophytic cells (produced from sporogenous tissue) in both the cases are the same.
- vi. Sexual reproduction is of oogamous type. Zygote is retained within the venter of archegonium to form embryo.

Differences from Bryophytes :-

1. In Bryophytes, the sporophytes are leafless and dependent on gametophytes for supply of water and food. In Pteridophytes, the sporophytes are leafy and independent of the gametophyte.
2. Vascular tissue differentiation is absent in bryophytes.

Characters of Pteridophytes resembling Spermatophyta (Gymnosperms) :-

1. Plants are differentiated into roots, stem and leaves. Plant body represents the sporophyte.
2. In both, sporophytes are independent at maturity and larger than the gametophytes. Gametophytes are dependent, very much reduced and developed within the sporophyte wall.
3. Vascular tissue is present. Xylem in both the groups lack trachea and the phloem lack companion cells.
4. In having ciliated sperms (Cycas, Ginkgo)
5. In being heterosporous condition, and in the arrangement of sporangia in sori (as in true ferns and Cycas.)
6. In the retention of the megasporon within the sporangium. (eg: Selaginella).
7. In the development of the embryo and the formation of a suspensor. (eg. Selaginella).

Characteristic features of Pteridophytes :-

- i. These are the first true land plants in the evolution of the plant kingdom.
- ii. Plant body is sporophytic and can be differentiated into true roots (exceptions: fossil Pteridophytes and Psilotum), stems and leaves.
- iii. Pteridophytes exhibit a well-defined heteromorphic alternation of generations. Diploid sporophyte is the dominant phase in life cycle.
- iv. Pteridophytes have an internal conducting system consisting of xylem and phloem - hence they are also known as vascular cryptogams.
- v. Asexual reproduction is by spores. Spores are produced within the sporangia. It may be homospores (sporangia are of one kind as spores are alike) or heterospores (sporangia are of two kind - microsporangia containing microspores and megasporangia containing megaspores).
- vi. Sporangia bearing leaves are called sporophylls. In heterospores pteridophytes sporophylls are of two types - microsporophylls (bearing microsporangia) and megasporophylls (leaves bearing megasporangia).
- vii) The spores germinate to produce a haploid gametophyte called prothallus. Homospores species usually produces

bisexual (monoecious or homothallic) gametophytes whereas heterosporous species produces unisexual (dioecious or heterothallic) gametophytes.

viii) Stem and roots of the plant body i.e. sporophyte are provided with stele - a central vascular cylinder of conducting system.

Life cycle:- In the life history of the pteridophytes there is a typical heteromorphic alternation of sporophytic and gametophytic generations. These two generations alternate with each other in a regular succession. The sporophytic or asexual generation is diploid ($2n$) which results from the union of haploid gametes (i.e. antherozoid and ovum). The gametophytic or sexual generation is haploid (n) and which results from the formation of haploid spores produced by the sporophyte. In this type of alternation, chromosome number is doubled at the time of gametic union and becomes halved at the time of spore formation.

Among pteridophytes the sporophyte is the dominant generation, as it very soon becomes independent of the gametophyte. On the basis of the spore produced, pteridophytes may be homosporous, which produces monoecious gametophyte, or heterosporous that produces dioecious gametophyte.

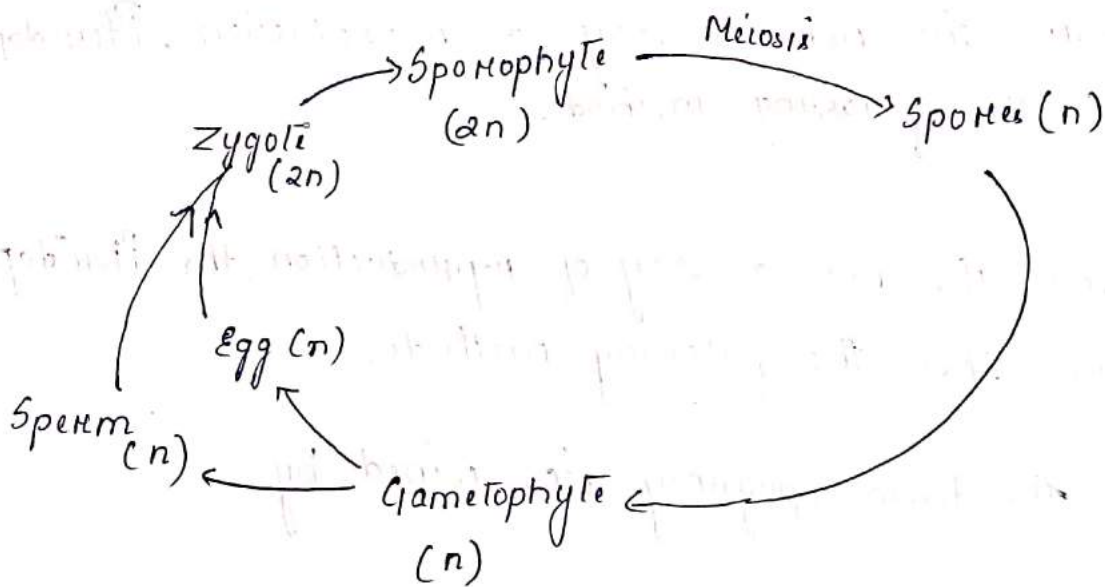


Fig: Life cycle of a homosporous pteridophyte

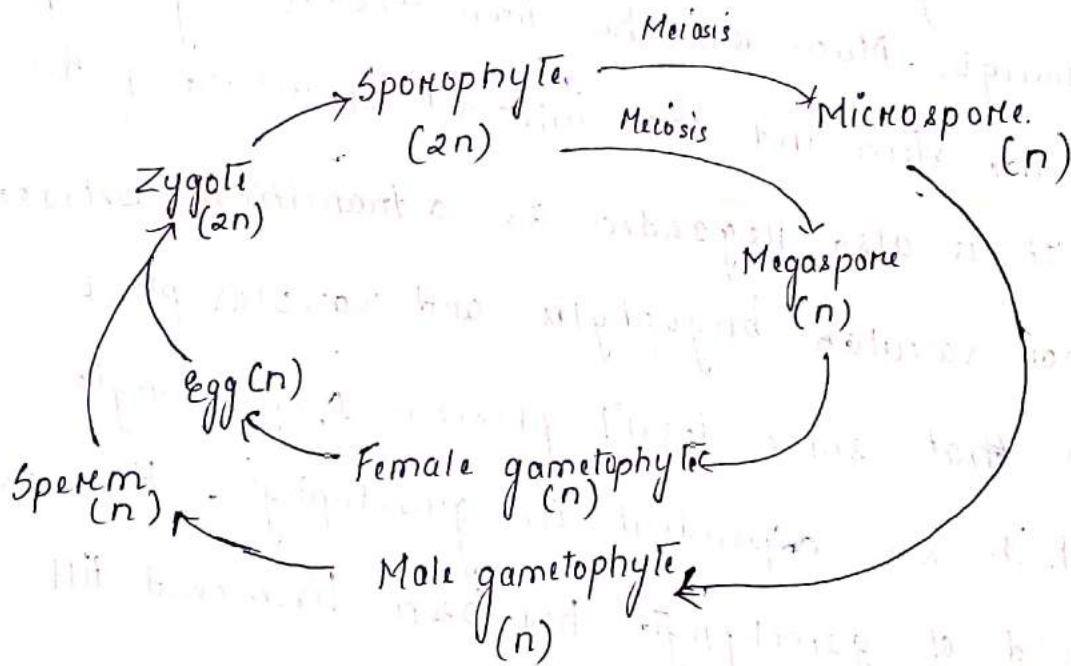


Fig: Life cycle of a heterosporous pteridophyte.

The Pteridophytes, apart from normal way of reproduction, also sometimes show following methods:

1. Aporogamy :- It is the development of the sporophyte without the fusion of the male and female gametes. It arises directly from the gametophyte. Here the sporophyte is haploid (n). Natural apogamy is common in ferns like Dryopteris, Adiantum, Pteris etc.
2. Apospory :- It is the development of the gametophyte directly from the sporophyte without the production of spores. Such a gametophyte is diploid ($2n$) in nature. Apospory is found in pteridophytes like Pteris