

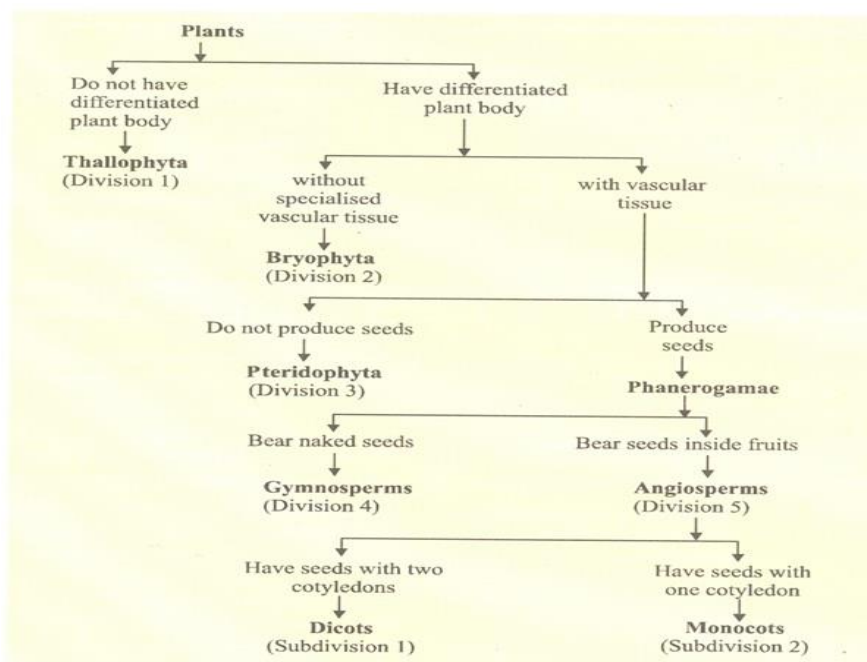
XI CLASS BIOLOGY NOTES

CHAPTER – 3 PLANT KINGDOM

In this chapter, we will deal in detail with further classification within Kingdom Plantae popularly known as the 'plant kingdom'. Eukaryotic, multicellular, chlorophyll containing and having cell wall, are grouped under the kingdom Plantae.

Different systems of classification

- **Artificial classification**– oldest classification and it is based on few vegetative and sexual characters.
- **Natural classification system**– it is based on natural affinities among the organisms in their external and internal features.
- **Phylogenetic classification system**– it is based on evolutionary relationship
- **Numerical taxonomy**– by using computers numbers and codes are assigned to all the characters and data are processed.
- **Cytotaxonomy**– it is based on cytological information like chromosome number, structure and behavior.
- **Chemotaxonomy** – it is based chemical constituents of the plants.



1.ALGAE:

- Simple, thalloid, autotrophic, aquatic organisms.
- Habitats – grow in moist soil and wood.
- Symbiotic (Lichens) grow on other animals (sloth bear)

- Size ranges from Unicellular colonial (volvox), Filamentous (spirogyra) and massive bodies (kelp)
- Reproduce vegetatively, asexually and sexually
- Spores are Zoospores (male),isogamous / anisogamous; Oospores (egg).

Economic importance:

1. Porphyra, Laminaria, Sargassum are used as food.
2. Marine brown algae (Algin) and red algae (Carrageen) are used as **Hydrocolloids**, which is a fibrous structure holds water and used to transport seedling.
3. Gelidium, Gracilaria are used to grow microbes, make ice creams and jellies.
4. Chlorella and Spirulina are rich in proteins and used as food supplements.

Algae are divided into 3 main classes;

TABLE 3.1 Divisions of Algae and their Main Characteristics

| Classes | Common Name | Major Pigments | Stored Food | Cell Wall | Flagellar Number and Position of Insertions | Habitat |
|---------------|-------------|---------------------------------|---------------------|---------------------|---|---|
| Chlorophyceae | Green algae | Chlorophyll a, b | Starch | Cellulose | 2-8, equal, apical | Fresh water, brackish water, salt water |
| Phaeophyceae | Brown algae | Chlorophyll a, c, fucoxanthin | Mannitol, laminarin | Cellulose and algin | 2, unequal, lateral | Fresh water (rare) brackish water, salt water |
| Rhodophyceae | Red algae | Chlorophyll a, d, phycoerythrin | Floridean starch | Cellulose | Absent | Fresh water (some), brackish water, salt water (most) |

a) Chlorophyceae(Green algae):

- Colonial / filamentous / unicellular
 - Vegetative reproduction is by fragmentation / spores
 - Asexual reproduction is by flagellated Zoospores
 - Sexual reproduction is by isogamous / anisogamous / oogamous
- Examples : - Volvox, Spirogyra, Chlamydomonas

b) Phaeophyceae(Brown algae)

- They are attached to substratum by Holdfast (root like), Stalk (stipe) and leaf (frond)
- Vegetative reproduction by fragmentation
- Asexual reproduction is by biflagellated zoospores

- Sexual reproduction is by Isogamous / Anisogamous / Oogamous.
- Examples: - Laminaria, Sargassum, Ectocarpus, Dictyota, Fucus.

c) Rhodophyceae (Red algae)

- Vegetative reproduction is by fragmentation.
- Asexually by non-motile spores.
- Sexually by non-motile gametes.
- Examples : - Porphyra, Gracilaria, Gelidium.

II. BRYOPHYTES

- They live in moist shaded areas in the hill.
- It is known as “amphibians of plant kingdom”.
- They occur in damp soil, humid and shaded places.
- Plant body lacks true roots, stem, leaves; they are attached to the substratum by unicellular / multicellular Rhizoids.
- The main plant is haploid and they produce gametes (Gametophyte – dominant).
- The male sex organ is Antheridium (antherozoids)
- The female sex organ is Archegonium (single egg)
- Antherozoids are released in water come into contact with Archegonium to form Zygote.
- Zygote develops into Sporophyte (diploid) undergoes meiosis to form haploid spores germinate to produce Gametophyte.

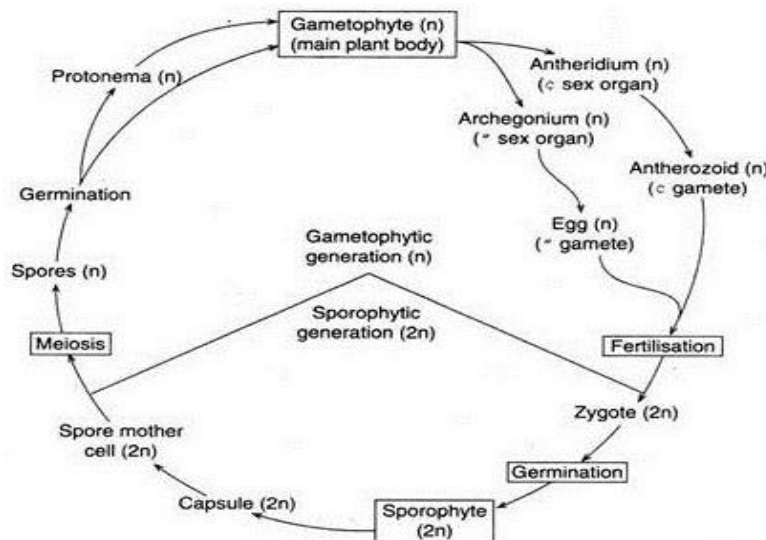


Fig. 6.62 : Diagrammatic representation of life cycle of bryophytes

Economic importance:

- Provide food for herbaceous mammals / birds.
- Sphagnum species (mosses) provide peat, used as a fuel.

- Due to its water holding capacity is used as packing material for trans-shipment of living materials.
- Mosses and Lichens form Pioneer community on bare rocks.
- Form dense mats on soil, so reduce the impact of rain and soil erosion.

Classes: - There are two classes- Liverworts, Mosses.

a) Liverworts:

- Moist, shady habitats, damp soil, bark of trees and deep in the woods.
- Plant body is Thalloid, have a tiny leaf structures.
- Asexual reproduction is by fragmentation / form gemmae (green, multicellular, asexual bodies) they detach from parent body and form as a new individual.
- Sexual reproduction form male & female sex organs sporophyte is differentiated into a foot, setae and capsule.
- Spore germinates to form gametophyte.

Example :-Marchantia

b) Mosses:

- The gametophyte of mosses consists of two stages- the first stage is **protonema** stage, which develops directly from spores. It is creeping, green and frequently filamentous. The second stage is the **leafy stage**, which develops from secondary protonema as lateral bud having upright, slender axes bearing spirally arranged leaves.
- Attached to the soil by Rhizoids
- Vegetative reproduction is by fragmentation / budding in secondary protonema.
- Sexual reproduction is by antheridia and archegonia
- Zygote develops into sporophyte and form capsule and it contains spores (haploid)

Example: - Sphagnum, Funaria

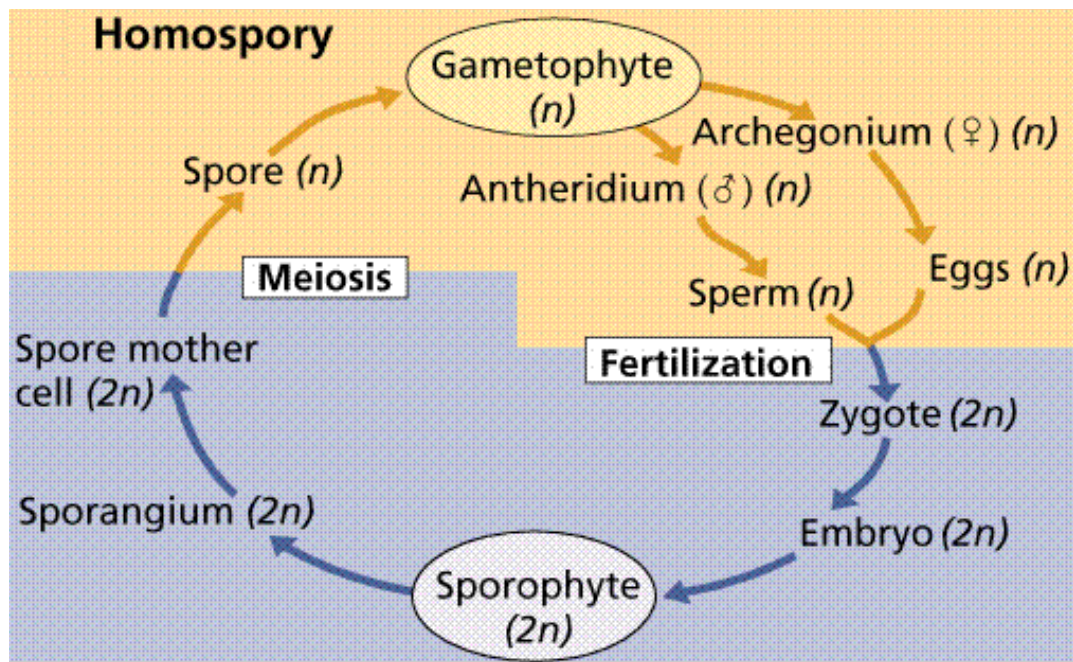
III.PTERIDOPHYTES (first land plants):

- They are used for medical purpose, ornamental and as soil binders and first terrestrial plants.
- They grow in cool, damp, shady places
- Possess vascular tissues (xylem and phloem)
- Main plant body is Sporophytes
- The body is differentiated into true roots, stem and leaves.
- Leaves may be small (microphylls – selaginella) or large (macrophylls – ferns) and bear sporangia and form sporophylls (leaf carrying spores).
- Sporangia produce spores by meiosis.
- Spore germinates to form gametophyte, called Prothallus.

- They need water for fertilization.
- Gametophyte bear male & female sex organs called Antheridia and Archegonia respectively.
- Gamete fusion results in zygote formation. Zygote develops into sporophytes (dominant phase).
- If all the spores are similar kind, it is called *Homospores*.
- Selaginella produces two kinds of spores, Macro and micro spores, hence known as *Heterosporous*.
- Macro and micro spores develop into female and male gametophytes respectively.
- Female gametophyte retained on sporophyte. It leads to the development of seed habit.

Classes: - There are four classes in Pteridophytae;

- a) Psilopsida – Ex. *Psilotum*
- b) Lycopsidea – Ex. *Selaginella*
- c) Sphenopsida – Ex. *Equisetum*
- d) Pteropsida – Ex. *Pteris*



HETEROSPORY LIFE CYCLE

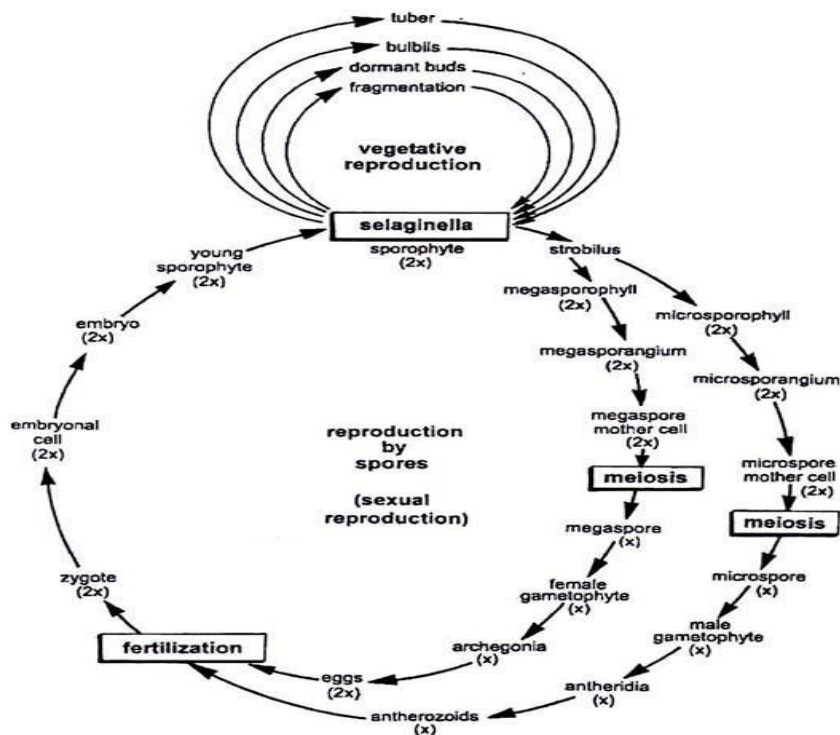


Fig. 20. *Selaginella* : schematic life cycle

IV. GYMNOSPERMS (Naked seeds)

- They are seed bearing plants.
- The ovules are not enclosed in an ovary, so no fruits.
- Tallest gymnosperm is Sequoia (red wood tree)
- Plant body is differentiated into roots, stems and leaves
- Roots are tap root – associated with other organisms like Pinus roots with Mycorrhizae and Cycas roots with Cyanobacteria like Nostoc and Anabaena (nitrogen fixing microbes)
- Stem can be branched / unbranched
- Leaves are simple / needle like – leaves show Xerophytic adaptation
- Gymnosperms are heterosporous, produce microspores and megaspores
- They form male cones & female cones
- Both cones can occur on some plant / different.
- Fertilization results in Zygote and embryo develop.
- Ovules form seeds.
- Gymnosperms show diplontic life cycle.
- They show Alternation of generation.
- Examples ; - Pinus, Cycas, Cedrus

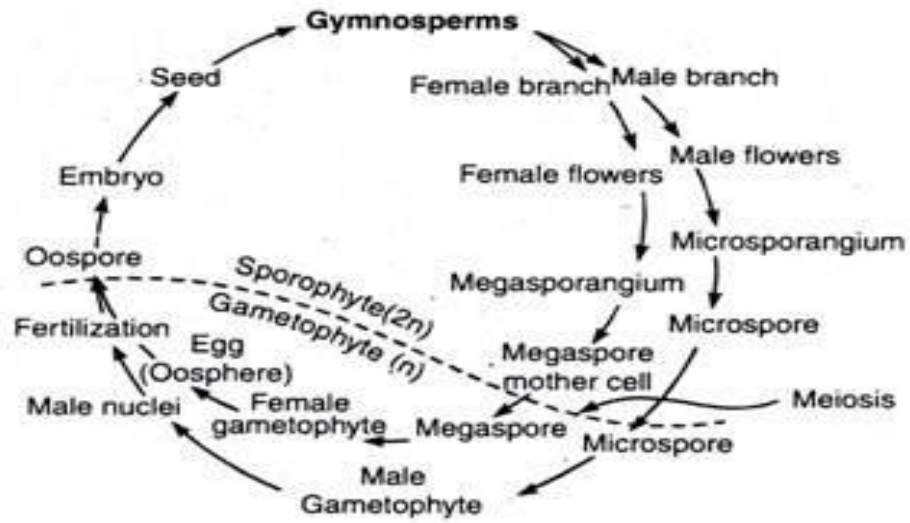


Fig. 1.2. Graphic life cycle of Gymnosperm.
