

2. Kingdom Plantae

Classification

- Artificial systems of classification are mainly based on vegetative characters or on the androecium structure.
- Natural systems of classification are mainly based on natural affinities among living organisms.
- Natural system of classification for flowering plants was given by Bentham and Hooker.
- Numerical taxonomy is the classification based on quantifiable characters.
- Cytotaxonomy is the classification based on cytological characters such as number, structure, and behaviour of chromosomes.
- Chemotaxonomy is the classification of organisms according to demonstrable differences and similarities in their biochemical compositions.
- The kingdom Plantae is divided into many divisions - Thallophyta (algae), Bryophyta, Pteridophyta, Gymnospermae, and Angiospermae.

Algae

- Algae are chlorophyll-bearing, thalloid organisms that are mainly aquatic.
- The commonly found spores for asexual reproduction are zoospores.
- Sexual reproduction is via fusion of gametes, which can be isogamous (example, *Chlamydomonas* and *Spirogyra*) or anisogamous (example, some *Chlamydomonas* species) or oogamous (example, *Volvox*).
- This group includes three classes named as Chlorophyceae, Phaeophyceae, and Rhodophyceae.
- Many members have haplontic life cycle.

1. Chlorophyceae (Green algae)

- Dominant pigments include chlorophyll a and b.
- Cell wall is made of cellulose and pectose.
- Stored food is in the form of starch stored in pyrenoids found in chloroplast. Pyrenoids also store proteins.
- Vegetative reproduction is through fragmentation; asexual reproduction is through zoospores; and sexual reproduction may be isogamous, anisogamous, or oogamous.



- Examples- *Chlamydomonas*, *Volvox*, *Spirogyra*

2. Phaeophyceae (Brown algae)

- Dominant pigments include chlorophyll a, c and fucoxanthin.
- Cell wall is made of cellulose and algin.
- Stored food is in the form of mannitol and laminarin.
- The plant body mainly consists of holdfast (for attachment), stipe (stem-like structure), and frond (for photosynthesis).
- Vegetative reproduction is through fragmentation; asexual reproduction is through biflagellate zoospores; and sexual reproduction may be isogamous, anisogamous, or oogamous.
- Examples - *Ectocarpus*, *Laminaria*, *Sargassum*

3. Rhodophyceae (Red algae)

- Dominant pigments include chlorophyll a, d and phycoerythrin.
- Cell wall is made of cellulose.
- Stored food is in the form of floridean starch.
- Vegetative reproduction is through fragmentation; asexual reproduction is through non-motile spores; and sexual reproduction is oogamous.
- Examples - *Polysiphonia*, *Gracilaria*, *Gelidium*

• Pteridophyta

- Pteridophytes are plants with vascular tissues that reproduce through spores.
- Require cool, damp, and shady place to grow.
- This group includes horsetails and ferns.
- Life cycle is haplo-diplontic type.
- Male reproductive organ is antheridium and female sex organ is archegonium.
- The main plant body is a sporophyte that bears sporangia in leaf-like appendages called sporophylls.
- Though pteridophytes are homosporous, but genera such as *Selaginella* and *Salvinia* show heterospory.
- Heterospory is the development of spores of two different sizes (microspores and megaspores) by the sporophyte.

• Pteridophyta can be further divided into four classes.

- Psilopsida: includes *Psilotum*
- Lycopside: includes *Selaginella*
- Sphenopsida: includes *Equisetum*
- Pteropsida: includes *Dryopteris*

Taxonomical Aids



- Taxonomy is the branch of biology that deals with identification, naming, and classification of organisms.
- Taxonomical aids are the procedures and techniques used to store and preserve information as well as specimens of various plants and animals.
- These help in identification, naming, and classification of the organisms.

Herbarium

- It is the storehouse of collected plant specimens.
- Collected plant specimens are dried, pressed, and preserved on sheets and then arranged systematically according to the universally accepted system of classification.
- Herbarium sheet also contains label regarding date, place of collection, scientific name, family, collector's name, etc. for every specimen.

Botanical gardens

- It has the collection of living plant species that are grown for identification and reference.
- Each plant contains labels indicating its scientific name and family.
- Some famous botanical gardens are Indian Botanical Garden, Calcutta (largest in India), Royal Botanical Garden, Kew (largest in world till date), and National Botanical Research Institute, Lucknow.

Museum

- It is the repository that has a collection of various plant and animal specimens that are preserved for study and reference.
- The organisms are preserved either in preservative solutions or in the form of dry specimens.
- It often has a collection of skeletons of animals also.

Zoological parks

- Wild animals are kept in protected environments.
- Provides opportunity for studying the behaviour and food habits of the animals

Key

- Keys are used for identification of plants and animals based on similarities and dissimilarities.
- Manuals, monographs, flora and catalogues are other means of recording descriptions.
- Manuals help in the identification of names of various species of organisms in a given area.
- Monograph is a detailed and well-documented work on any particular taxon.

