Plant Kingdom.

System of Classification →

① Artificial Classification System → Linneas, based on cell wall, androcium str., equal weightage to vegetative and sexual characters

② Natural System Classification → Bentham and Hooker → Ultrastructure, anatomy, embryology.

③ Phylogenetic Classification → (evolutionary relationship: No. taxonomy, Cytotaxonomy, Chemotaxonomy — Chemicals; Cytological info; data, computer, no., codes)

← Algae →

General Features →

Chlorophyll
Simple thallus
Aquatic Habitat

Pigments → Chl A, Carotines, Xanthophyll, Fucaxanthin, and phycobilins.

Different shape and size
- Microscopic / Unicellular (Chlymadomonas.
- Colonial - Volvax.
- Filamentous - Ulothrix and Spirogyra.

Occurance →

- Found in moist stones, soils and wood.
- appears as lichens (algae + fungi)
- in association with animals like sloth bear

Reproduction →

① Vegetative Reproduction → Fragmentation eg- Spirogyra.

② Asexual Reproduction → By production of spores (zoospores). They are flagellated (motile) and on germination gives rise to new plants.

③ Sexual Reproduction → Fusion of 2 gametes

i) Isogamous - gametes similar in size. (Ulothrix, Spirogyra.

ii) Anisogamous - gametes dissimilar in size (Chlymadomonas)

iii) Oogamous - large non-motile female gamete with sperm (Volvax, Fucus)

Benefits of Algae →

- photosynthesis — fix CO_2 ($\frac{1}{2}$%) of earth.
- Dissolved O_2 ↑↑
- 1° producers, food cycle of aquatic life
- Marine algae (70) used as food
  eg- porphyra, Laminaria, Sargassum
- Chlorella, Spirulina (food supplements)
- Agar → used in making jellies obtained from gralilaria and gelidium

Red (Cargeen)
Brown algae (Algin) → Water holding capacity. (Trans shipment)

① Chlorophyceae → (Green algae)

Usually green due to pigments of Chl a and b in chloroplasts.

Chloroplasts may be discoid plate, reticulate cup shaped, spiral, or ribbon.

Most of them have one or more pyrenoids (storage bodies) : pyrenoids ↓ proteins beside starch

Reproduction →

① Vegetative Reproduction — fragmentation / spores
eg- Spirogyra.

② Asexual Reproduction — flagellated zoospores.
eg- zoosporangia

③ Sexual rep.ⁿ →
Isogamous, anisogamous, oogamous

Cell wall in green algae is rigid in which an inner layer of cellulose and outer layer of pectinose is present.

Examples → Chlymadomonas, Volvax, Spirogyra

② Phaeophyceae → (Brown algae)

Found in marine habitat

Olive green - Brown

Chl. a, c, caretenoids, xanthophyll, fucaxanthin

Food stored as complex carbohydrate, which may be in form of laminarin / mannitol

Vegetative cells - Cellulosic wall, covered by gelaterous coat of algin

- protoplast contain plastids, central vacuole and nucleus.
- plant body is attached to substratum by holdfast, and has stalk (stipe) and leaf like photosynthetic organ (frond)
- example – Ectocarpus, dictyota, laminaria, sagasum and fucus

diplontic life cycle.

* Asexual rep.ⁿ – Biflagellate zoospore (pear shaped)
2 unequal laterally attached flagella.

* Sexual rep.ⁿ –
Anisogamous, Isogamous, Oogamous
pyriform gametes – pear shaped
Bilateral flagella

③ Rodophyceae (Red Algae) →

- Red pigment, r-phycoerythrin
- Red thalli of most of red algae are multicellular.
- Complex body organization
- food storage = floridean starch similar to amylopectin and glycogen in structure
- Examples – Polysiphonia, porphyra, gracilaria, gelidium.

Reproduction –
Vegetative rep.ⁿ – Fragmentation
Asexual rep.ⁿ – non motile spores
Sexual rep.ⁿ – Oogamous, by non motile gametes
Complex post-fertilization developments

Comparison table at last

Bryophytes →

amphibians of plant kingdom.
Live in soil, but need water for sexual reproduction
Thallus like, prostate/erect, attached to substratum by unicellular/multicellular rhizoids
Main plant body – Haploid.
produce gametes – gametophyte
Sex Organs – multicellular.
anthredium → biflagellate anthrezoids
achegonium – flask shape, single egg
Zygote doesn't goes for meiosis directly, they produce sporophyte (multicellular)

Importance of Bryophytes →

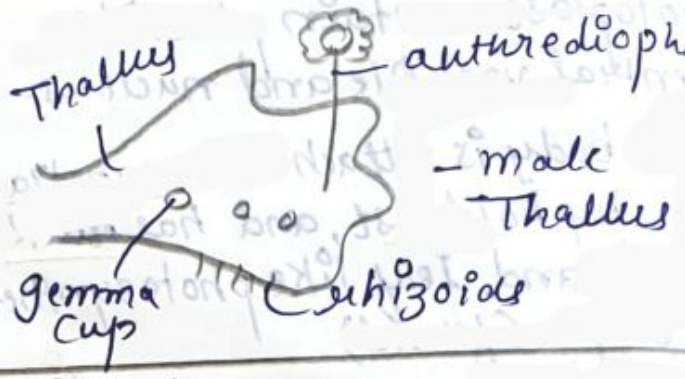
Mosses – food for herbacious mammals, birds and other animals.
Sphagnum (moss) – peat, used as fuel, it has water holding capacity so that, used as packing material for transshipment of living material

Ecological importance.

plant succession on bare rocks

Mosses along with lichens decomposes rocks, making substrate suitable for growth of higher plants

Mosses - dense mat on soil, prevent soil erosion



① Liverworts —

asexual rep.ⁿ — Fragmentation of thalli / formation of gemmae

Gemma are green, multicellular, asexual bud that develop in small receptacles (gemma cups) on thalli

Gemmae detach from parent body and germinate to form new individuals

Sexual rep.ⁿ — Sporophyte

foot seta capsule

after meiosis, spores are produced within capsule

Spores germinate → free living gametophytes

example - marchantia

female thallus - archaegoniaph - orc

② Mosses —

predominant stage - gametophyte

① protonema stage - 1st stage which develop from spore. Creeping, green, branched, filamentous

② Leafy stage — 2nd stage develop from secondary protonema as lateral bud.

Upright, slender axes bearing spirally arranged leaves attached to soil through multicellular and branched rhizoids.

This stage bears sex organs

Vegetative rep.ⁿ — fragmentation and budding in secondary protonema

Sexual rep.ⁿ — antheridia and archegonia produced at leaf apex

fertilization → Zygote → Sporophyte

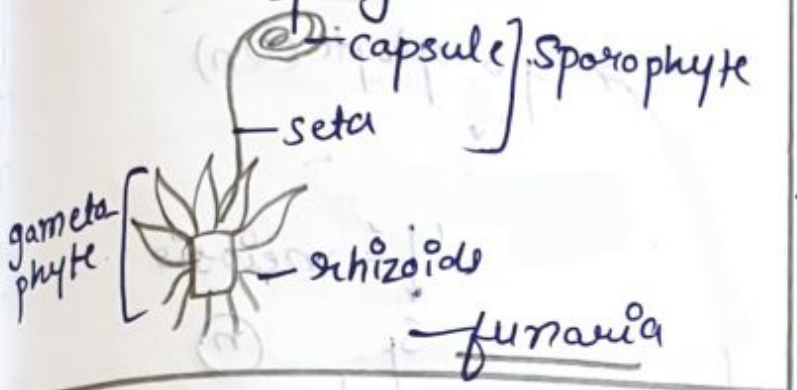
more elaborate than liverworts.

foot seta capsule

meiosis spores

mechan → Spore dispersal.

example - Funaria, polytrichum, and sphagnum



Main plant body (Gametophyte) (n)

↓ mitosis

gametes (n)

antheridium (motile) archegonium (non-motile)

water

Zygote (2n)

Sporophyte (2n)

attached to gametophyte — foot, seta, Capsule

meiosis

Spores (n)

Pteridophytes —

- Horsetails and ferns.

→ main plant body - sporophyte

→ Well differentiated vascular tissues — true root, stem, leaves

→ leaves — microphylls (small) — Selaginella

macrophylls (large) — ferns.

→ sporophyte → sporangia

↓

Substended by leaf like appendages called sporophylls

→ Sporophylls - distinct compact structures called strobili or cones (Selaginella, equisetum)

- Sporangia produce spores by meiosis in spore mother cells
- Spores germinate to give rise to inconspicuous, small, multicellular, free living, mostly photosynthetic thalloid gametophyte → prothallus.

→ gametophyte — antheridia, archegonia

→ water needed for transfer of antherozoid to mouth of archegonium

→ antherozoid fuses with egg in archegonium

↓

Zygote

↓

Sporophyte — multicellular

→ Homosporous plants (similar kind of spores)
eg - Club moss, puzzle grass

→ Heterosporous plants (maro, micro spores)
eg - Selaginella and Salvinia ★

megaspores and microspores
↓ germinate
♀, ♂ gametophyte

- female gametophytes are retained on parent porophytes for variable periods.
- female Gametophyte
  Zygote → Embryo.

event precursor to Seed Habit.

* Imp step in Evolution.

Sellaginela Bryoptis → Sanjeevani Booti.

- pteridophytes have 4 classes

(1) psilopsida – psilotum
(2) Lycopsida – Selaginella Lycopsida
(3) Sphenopsida – Equistem
(4) pteropsida – dryopteris, peteris, adiantum.

Neet Slayer.. ♡

Gymnosperms (Naked Seeds)

- Seed bearing plants.
- Ovules are not enclosed in any ovary wall, no fruits, naked seeds.
- Tallest Gymnosperm – Sequoia (Redwood tree)
- plant Body ← root – Tap root (pinus roots, Mycorrhiza; cycas roots, Anabena Nostoc (cynobact.))
  stem
  leaves – well-adapted to withstand extremes of temp humidity, wind.

Gymnosperms – Heterosporous, produce haploid ~~organism~~ microspores and megaspores.

- Form ♀ and ♂ cones.
- ♀, ♂ cones on same tree – pinus.
  different tree – cycas
- ♀, ♂ gametophytes of gymnosperms don't have independent free-living existence. They remain within the sporangia retained on sporophyte
- Winged pollen grains present in pinus.

Angiosperms — Sexual Rep.ⁿ in Flowering plants.
Class 12th → Chapter 2.

Plant Cycle and alteration of Generation

(1) Haplontic Life Cycle →
- Sporophytic gen. is represented only by 1 celled zygote.
- There are no free living sporophyte. Dominant photosynthetic phase in such plants is free living gametophyte.

eg- Many algae like Volvox, Spirogyra, Some species of Chlymadomonas

(2) Diplontic Life Cycle —
Diploid sporophyte is dominant, photosynthetic and independent phase of plant, whereas gametophytic phase is represented by single to few-celled haploid gametophyte

eg- Gymnosperms
Angiosperms.

(3) Haplo-Diplontic life Cycle —

– Bryophytes, pteridophytes

haploid gametophyte dominant, independent, photosynthetic, thalloid, erect phase

diploid sporophyte dominant, independent, photosynthetic, vascular plant body

exceptions – Haplo-Diplontic Algae - Ectocarpus, polysiphonia, Kelps.

Diplontic algae - Fucus

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