Plant Kingdom

Kingdom Plantae includes green, brown and red algae, liwerworts, mosses, ferns and seed plants with or without flowers. They have the following characters:-

(1) Multicellular organisms with walled and frequently vacuolate eukaryotic cells.

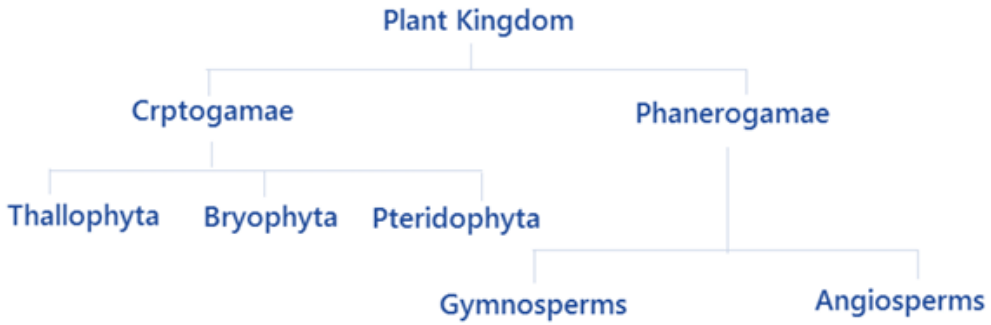
(2) They contain photosynthetic pigment in plastids.

(3) Principle mode of nutrition is photosynthesis but number of plants has become absorptive.

(4) Reproduction is primarily asexual or sexual. The reproductive organs are multicellular. (5) A multicellular embryo is formed during development from the zygote. Algae lack embryo stage.

Life cycle consists of alternating haploid gametophyte and diploid sporophyte generation. This phenomenon is called alternation of generation.

Thallophyta Algae :



(1) The branch of botany dealing with the study of algae is called as phycology or algology.

(2) It is derived from the Greek word Phykos which means 'alga' or 'sea weed'.

(3) They are simple, autotrophic non-vascular plants having unicelled sex organs and no embryo formation.

(4) According to Fritsch, (1935) the designation alga must include all holophytic organisms.

(5) Specialized habitat.

(1) Chlorophyceae

Plants fresh water or marine.

Forms unicelled to parenchymatous.

Chief pigments – Chlorophyll a, b; a, b, g– carotenes, lycopene, lutein, violaxanthin.

Reserve food – Starch and oils.

Zoospore formation occurs.

Male gametes flagellate.

Sexual reproduction – Isogamous, anisogamous or oogamous.

(2) Phaeophyceae

Plants marine

Forms unicelled to parenchymatous

Chief pigments – Chlorophyll a, c; beta–carotene, fucoxanthin, lutein, violaxanthin, diatoxanthin.

Reserve food – Laminarin, mannitol and oils.

Zoospore formation occurs.

Male gametes flagellate.

Sexual reproduction – Isogamous , anisogamous or oogamous.

(3) Rhodophyceae

Plants generally marine.

Forms filamentous to parenchymatous.

Chief pigments – Chlorophyll a, d is present but chlorophyll c is absent; a, b–carotene, lutein, violaxanthin, fucoxanthin, myxoxanthin, g–phycoerythrin, g–phycocyanin and allophycocyanin.

Reserve food – Floridean starch, galactan –SO4 polymers.

No zoospore formation.

Male gametes non-flagellate.

Sexual reproduction by specialized type of oogamy.

Life cycle haplobiontic or diplobiontic.

Bryophyta

(1) Bryophyta (Gk: Bryon = moss; phyton = plants) includes the simplest and primitive land plants.

(2) Due to peculiar type of their habitats, they are regarded as 'the amphibians of the plant kingdom'.

(3) Habitat: Bryophytes usually grow in moist and shady places.

(4) Specialized habitats: Some bryophytes grow in diverse habitats such as –

(a) Aquatic (e.g., Riccia fluitans, Ricciocarpus natans, Riella), epiphytes (e.g., Dendroceros, Radula protensa and many mosses), saprophytes (e.g., Buxbaumia aphylla, Cryptothallus mirabilis)

(b) Dry habitats such as dry heaths (e.g., Polytrichum juniperinum), deserts (e.g., Tortula desertorum) and dry rocks (e.g., Porella platyphylla).

(5) Sexual reproduction: The male sex organ is called as antheridium and the female as archegonium.

(6) Salient features of classes

(i) Hepaticopsida: The latin word Hepatica means liver. Thus the members of hepticopsida are popularly known as liverworts.

(ii) Anthocerotopsida: This class is characterized by the following characters – Gametophyte is thalloid. Thalli are lobed, dorsiventral, and internally homogenous without any differentiation of tissues.

Scales are absent.

Each cell possesses single (some times more) large chloroplast with central pyrenoid.

Antheridia are endogenous in origin, borne singly or in groups inside the closed cavities.

Sporogonium is differentiated into foot, meristematic zone and capsule (the seta is absent).

Capsule has central sterile columella.

(iii) Bryopsida: The members of bryopsida are commonly known as mosses. The class is characterised by the following characters –

Gametophyte is differentiated into two stages – prostrate protonema and erect radial leafy shoot.

Leaf-like appendages are spirally arranged on stem – like axis.

Rhizoids are multicellular with oblique septa.

Sex organs develop from superficial cells.

Sporogonium is differentiated into foot, seta and capsule.

Wall of capsule is several layered with stomata on epidermis.

The capsule has central columella.

Pteridophyta

(1) The pteridophytes (Gk. Pteron = feather and phyton = plants ; means plants with feather like fronds or ferns). They are flowerless, seedless, spore producing vascular plants which have successfully invaded the land.

(2) Habitat: The plants of pteridophytes are mostly terrestrial. They prefer shady habitats.

(3) They have Sporophytic plant body

(4) Apical growth: The pteridophyte generally possesses a single apical cell with three cutting faces in the shoot apex.

(5) Salient features of sub-phyla.

(i) Sub-phylum: Psilopsida

(a) These are the oldest known vascular plants; most of them (except Psilotum and Tmesipteris) are fossils.

(b) Plant body is relatively less differentiated.

(c) Roots are absent; instead dichotomously branched rhizome is present.

(d) Aerial axis is either naked or have small spirally arranged leaves.

(e) Sporangia are cauline (i.e., directly borne on the axis or stem); they are lateral or terminal in position. e.g., Psilotum, Tmesipteris.

(ii) Sub-Phylum: Lycopsida

(a) Plant body is differentiated into root, stem and leaves.

(b) Leaves small (i.e., microphyllous) with a single unbranched vein.

(c) Sporangia develop in the axil of the sporophylls.

(d) Sporophylls generally form compact strobili. e.g., Lycopodium, Selaginella, etc.

(iii) Sub-Phylum: Sphenopsida

(a) Stem differentiated into nodes and internodes.

(b) Leaves microphyllous, present in whorls at each node.

(c) Sporangia are borne on the sporangiophores which form compact cones at the apex of the fertile branches. e.g., Equisetum.

(iv) Sub-Phylum: Pteropsida

(a) Plant body well differentiated into root, stem and leaves.

(b) Leaves megaphyllous, pinnately compound.

(c) Sporangia develop on the ventral surface of the sporophylls, usually aggregated into sori. e.g., Dryopteris, Pteris, Pteridium, Polypodium, etc.

Angiosperms

The angiosperms, or flowering plants, constitute the most dominant and ubiquitous vascular plants of present day flora which changed the green and yellow melancholy of the earth's vegetation by the colourful brightness and fragrance of their flower.

(i) Dicotyledons : They are show following distinguished characteristics.

(a) Tap roots found in the members of this group.

(b) The leaves in members of these class exihibit reticulate (net like) venation.

(c) The flowers are tetramerous or pentamerous having four or five members in the various floral whorls, respectively.

(d) The vascular bundles arranged in a ring, numbering 2–6, open and with cambium.

(e) The seeds of dicotyledons are with two cotyledons as the name indicate.

(ii) Monocotyledons:

They are show following distinguished characteristics:

(a) Adventitious roots found in the members of this group.

(b) The leaves are simple with parallel venation.

(c) The flowers are trimerous having three members in each floral whorl.

(d) The vascular bundles scattered in the ground tissue, many in number, closed and without cambium.

(e) The seeds of monocotyledons are with one cotyledon as the name indicates. e.g., Cereals, bamboos, sugarcane, palms, banana, lilies and orchids.

Gymnosperms

(1) Living gymnosperms are mostly perennials, xerophytic, evergreen, arboreal and woody plants.

(2) They grow as wood trees, bushy shrubs or rarely as climbers (e.g., Gnetales).

(3) None of them are herbs or annuals.

(4) External features:

(i) The plant body is sporophyte and differentiated into root, stem and leaves.

(ii) The plant possesses well developed tap root system. In some cases the roots are symbiotically associated with algae (e.g., Coralloid roots of Cycas) or with fungi (e.g., Mycorrhizal roots of Pinus).

(iii) The stem is erect, aerial, solid, woody and branched (unbranched in Cycadales) but almost tuberous in Zamia.

(iv) The leaves may be microphyllous or megaphyllous