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PLANT KINGDOM

Plant Kingdom is subdivided as follows:

(A) Cryptogams: Plants without seeds

(1) Pteridophytes: Plants with seeds

a. Thallophytes

Elphyphytes

Pteridophytes

a. Gymnosperms

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b. Angiosperms

Thallophyta – Comprises the simplest plants which possess undifferentiated or thallus like forms, reproductive organs single called gametangia. It includes only algae.

Characteristic of algae

- Plant body is thallus, which may be unicellular, colonial, filamentous or parenchymatous.
- Vascular tissues and mechanical tissue are absent.
- Reproduction is vegetative by fragmentation, asexual by spore formation (isospores) and sexual reproduction by fusion of two gametes which may be isogamous (Chlorophyta) or oogamous (Rhodophyta).
- Life cycle is various-haplontic or diplohaplontic.
- Algae is subdivided as; Chlorophyceae, Charophyceae, Rhodophyceae.

Green Algae	Brown Algae	Red Algae
Mostly fresh water and sub aerial	Mostly marine	Mostly marine
Chlorophyll a and b type	Chlorophyll a and c type	Chlorophyll a and b type
Reserve food is starch	Reserve food is laminarin	Reserve food is floridean starch
Cell wall is of cellulose	Cell wall contains cellulose and algin	Cell wall contains cellulose and poly-sulphate esters
Zoospores present.	Zoospores present.	Zoospores absent
Chlorella, Ulothrix, Spirogyra	Fucus, Sargassum, etc	Codium, Gelidium, Porphyra etc

Economic importance –

- A number of brown algae (Laminaria, Sargassum) are used as food in some countries.
- Fungus and Laminaria are rich source of iodine.
- Laminaria and Ascophyllum have antibiotic properties.
- Alginic acid is obtained from fungus and liverworts that grow in moist shady region.

Bryophytes – They are non-vascular mosses and liverworts that grow in moist shady region. They are called amphibians of plants kingdom because these plants live on soil but dependent on water for sexual reproduction.

Characteristic features –

- Roots are absent but contain rhizoids
- Vegetative reproduction is by fragmentation, tubers, gemmae, buds etc. Sex organs are multicellular and jacketed. Antheridium and archegonium produce male and female gametes called antherozoids and egg cell.
- Sporophyte is parasite on gametophyte.
- Divided as Hepaticopsida (Liverworts), Bryopsida (Mosses),

- The thallus is dorsiventral flattened, dichotomously branched with or without leaf-like appendages.
- Unicellular rhizoids, multicellular stalks and completely parasitic sporophyte or sporangium.
- Asexual reproduction takes place by fragmentation of thallus or formation of specialized structure called gemmae. Gemmae are given, multicellular, asexual buds, which develop in small receptacles called gemma cups. The gemmae becomes detached from the parent body and germinate to form new individuals.
- During sexual reproduction male and female sex organs are produced on same thallus or different.
- The sporophyte is differentiated into foot, seta and capsule.

Mosses —

- The gametophyte of mosses consists of two stages the first stage is protonema stage. The second stage is the leafy stage.
- Vegetative reproduction by the fragmentation and budding in secondary protonema. A sex organ develops on leafy shoots.
- Common examples are Funaria, Polytrichum, Sphagnum etc.

Pteridophytes

- They are seedless vascular plants that have sporophytic plant body and inconspicuous gametophyte.
- Vascular tissue are present but vessels are absent from xylem and companion cells and sieve tube are absent.
- In some plants a specialized structure called strobili or cone is formed.
- Sporangia produce spores by meiosis in spore mother cells. Spores germinate to produce multicellular thallus, prothallus.
- Gametophyte bears male and female sex organ called antheridium and archegonium. Water is required for fertilization of male and female gametes.
- Most of Pteridophytes produce spores of similar kind (homosporous) but in Selaginella and Isoetes, spores are of two kinds (heterosporous) larger called megaspore that produce female gametophyte and smaller microspore that produce male gametes.
- Pteridophytes Classes
 Psilopsida (Psilotum, Lycopodium, Selaginella), Sphenopsida (Equisetum, Adiantum).

Gymnosperms

- Gymnosperms are those plants in which the ovules are not enclosed inside the carpel wall and remain exposed before and after fertilization.
- Stem may be unbranched (Cycas) or branched (Pinus). Root is tap. Leaves may be simple or compound.
- They are heterosporous, produce haploid microspore and megaspore in male and female Strobili respectively.
- Example - Pine, Cycas, Cedrus, Ginkgo etc.

Angiosperms

- Pollen grain and ovules are developed in specialized structure called flower or ovule.
- Size varies from almost microscopic Wolff (DI cm) total! tree Eucalyptus more than 120m).
- Angiosperms divided into two classes: Dicotyledons and Monocotyledons

Monocotyledons	Dicotyledons
a. Single cotyledons.	a. Two cotyledons.
b. Parallel venation.	b. Reticulate venation.
c. Fibrous root system.	c. Tap root system.
d. Closed vascular bundle.	d. Open vascular bundle.
e. More number of vascular bundles.	e. Less number of vascular bundles.
f. Banana, wheat, rice.	f. Gram, mango, apple.

- **Double fertilization**- Each pollen grain produce two male gametes. One gamete fuses with egg to form embryo, Syngamy and other gametes fuse with two polar nuclei to form endosperm, triple fission.. &mu. fertilization takes place twice so it is called double fertilization.

Alternation of generation

Different plant groups complete their life cycles in different patterns. Angiosperms complete their life cycle in two phases- a diploid sporophyte and haploid gametophyte. The two follows each other. This is called alternation of generation..

(a) **Haplontic**- Saprophytic generation is represented by only the one-celled zygote. Meiosis in zygote results into haploid spores to form gametophytes, which is the dominant vegetative phase. Example. Volvox, Spirogyra etc.

Diplontic- Diploid sporophyte is dominant, independent, photosynthetic plants. The gametophyte is represented by single to few celled. All seed bearing plants fall under this category.

(b) **Haplodiplontic**- Both phases are multicellular and intermediate conditions are present in plants. Example. Algae and Pteridophytes.