

Ch-03

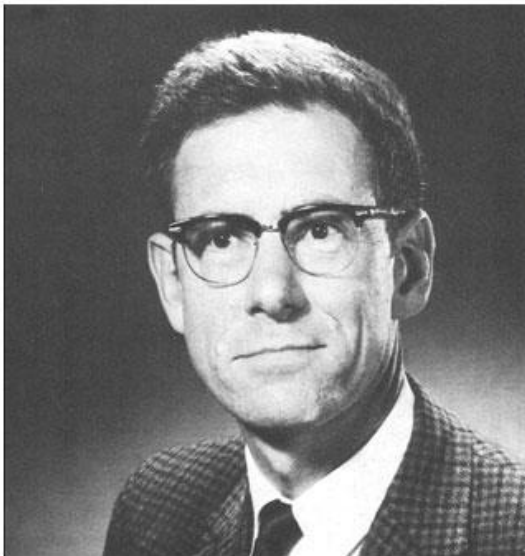


PLANT KINGDOM

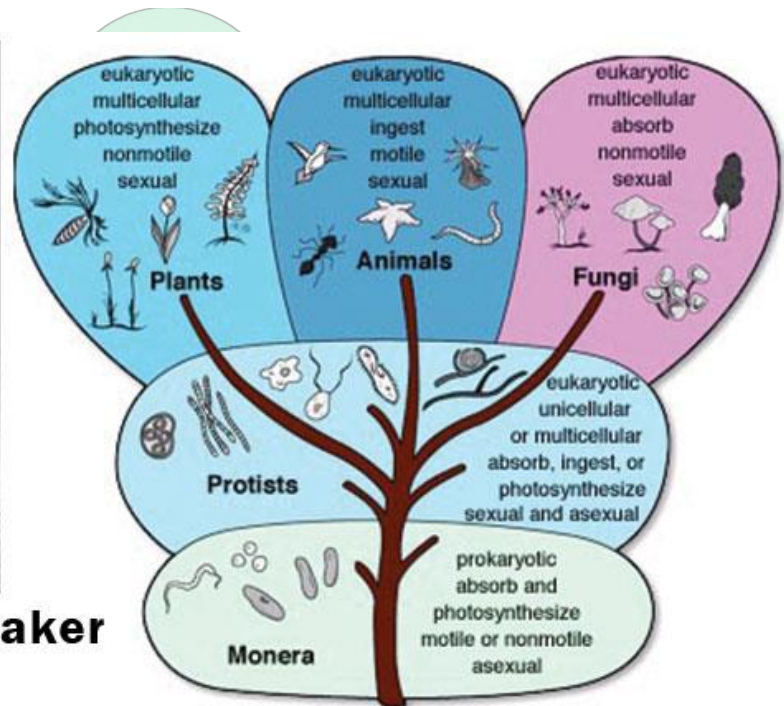
Learning Objectives: At the end of the session, you will be able to:

- ✓ Explain Different systems of Classification.
- ✓ Differentiate between Artificial and Natural System of Classification.
- ✓ Explain Algae and its significance.
- ✓ Differentiate between various classes of Algae.
- ✓ Explain various modes of reproduction in Algae.

DISCUSSION:



Robert Harding Whittaker
(1920 – 1980)



R H WHITTAKER'S FIVE KINGDOM CLASSIFICATION INCLUDES

- ☞ MONERA,
- ☞ PROTISTA,
- ☞ FUNGI,
- ☞ PLANTAE
- ☞ ANIMALIA



CLASSIFICATION :(Grouping of Organism on the Basis of Similarity and Differences)✓ **Artificial System of Classification**

- Based on a few characteristics and used vegetative characters or on the androecium structure
e.g., By Carolus Linnaeus, based on androecium structure

Disadvantage : Separated the Closely Placed Organism as it gave same weightage to Vegetative and Sexual Characters.

✓ **Natural System of Classification**

- Based on natural affinities among organisms & Included external as well as internal features
e.g., By George Bentham and J. D. Hooker

✓ **Phylogenetic System of Classification**

At present phylogenetic classification systems based on evolutionary relationships between the various organisms are acceptable. This assumes that organisms belonging to the same taxa have a common ancestor.

- Based on evolutionary relationships between the various organisms
- e.g., By Hutchinson

✓ **Numerical Taxonomy :**

- Carried out using computers
- Based on all observable characteristics
- Data processed after assigning number and codes to all the characters.

Advantage : Each character gets equal importance and a number of characters can be considered.

✓ **Cytotaxonomy :**

- Based on cytological information.
- Gives importance to chromosome number, structure and behaviour.

✓ **Chemataxonomy :**

- Based on chemical constituents of the plants.

ALGAE

Algae are **chlorophyll-bearing, simple, thalloid, autotrophic and largely aquatic** (both fresh water and marine) organisms.

They occur in a variety of other habitats: moist stones, soils and wood.



red
alga



brown
alga



green
alga

Some of them also occur in association with fungi (lichen) and animals (e.g., on sloth bear).


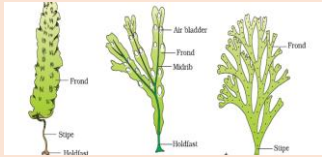



Algae are **unicellular like Chlamydomonas**, **colonial like Volvox** or **filamentous like Spirogyra**. They are simple, thalloid, autotrophic and occur in water, soil, wood etc.

IMPORTANCE OF ALGAE :

- At least **half of the total carbon dioxide fixation** on earth carried out by them.
- **Increase oxygen level** in the environment.
- Many species like Laminaria, Sargassum etc. are **used as food**.
- Agar obtained from Gelidium and Gracilaria is **used in ice-creams and jellies**.
- Algin obtained from brown algae are carrageen from red algae used commercially.
- Chlorella and **Spirulina** are unicellular algae, rich in protein and used even by **space travelers**.

CLASSES OF ALGAE:

CLASSES----- FEATURES	CHLOROPHYCEAE GREEN ALGAE	PHAEOPHYCEAE BROWN ALGAE	RHODOPHYCEAE RED ALGAE
MAIN PIGMENT	Chlorophyll 'a' and 'b'.	Chlorophyll 'a', 'c' and fucoxanthin.	Chlorophyll 'a','d' and r-phycoerythrin.
HABITAT	Fresh Water, Brackish Water and Salty Water	Rare in Fresh Water but Found in brackish and Salty Water	Found on surface as well as great depths in oceans.
CELL WALL	Cell wall has inner layer of cellulose and outer layer of pectose.	Cell wall has cellulose and lignin or gelatinous coating of algin.	Cell wall as cellulose.
RESERVE FOOD	Starch is stored Food	Has mannitol and laminarin as reserve food material.	Reserve food material is Floridian starch.
EXAMPLE	e.g., Chlamydomona, Volvox, Spirogyra.	e.g., Ectocarpus, Fucus, Laminaria.	• e.g., Polysiphonia, Porphyra, Gelidium.
	 <p>Volvox, Chlamydomonas, Chara</p>	 <p>Laminaria, Dictyota, Fucus,</p>	 <p>Porphyra, Polysiphonia</p>

REPRODUCTION IN ALGAE

Vegetative Reproduction : by fragmentation
Asexual Reproduction : Flagellated zoospores in Chlorophyceae
 Biflagellate zoospores in Phaeophyceae
 By non-motile spores in Rhodophyceae.

Sexual Reproduction: By Motile Gametes

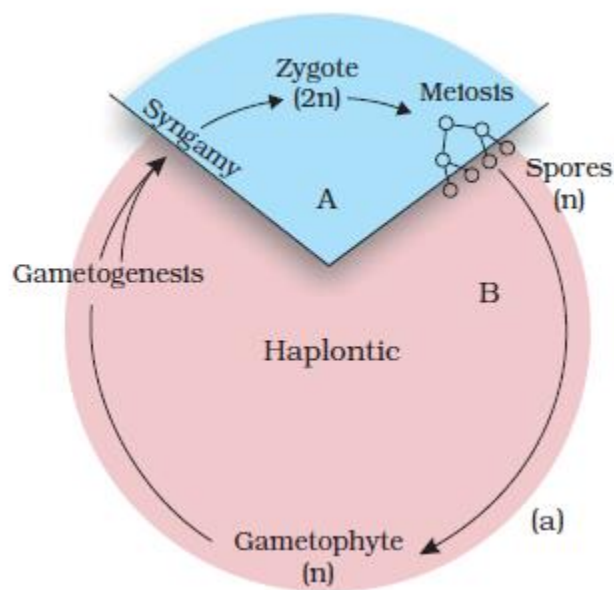
Isogamous (These gametes can be flagellated and similar in size (as in Chlamydomonas) or non-flagellated (non-motile) but similar in size (as in Spirogyra))

Anisogamous (Fusion of two gametes dissimilar in size, as in some species of Chlamydomonas or

Oogamous (Fusion between one large, non-motile (static) female gamete and a smaller, motile male gamete) in Chlorophyceae and Phaeophyceae.

By non-motile gametes in Rhodophyceae.

Basic Pattern of Life Cycle in Algae: Haplontic Life Cycle



Sporophyte	Single Celled Zygote	Sporophyte are not Freelifing
Gametophyte	Formed from Meiosis of Zygote	Gametophyte is Photosynthetic, Independent
Example: Volvox, Spirogyra & some Species of Chlamydomonas		

Images taken from

<https://in.pinterest.com/pin/164170348887649087/>

<https://microbenotes.com/five-kingdom-system-of-classification-features-and-limitations/>

