



PHYCOLOGY



CLASSIFICATION OF ALGAE 1



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Classification of algae based on 6 major characteristics

- Nuclear Organization
- Nature of Cell Wall Components
- Pigmentation and Photosynthetic Apparatus
- Nature of Reserve Food
- Flagellation
- Type of Life Cycle and Reproduction

Nuclear Organization:

- On the basis of nuclear organization algae can be prokaryotic or eukaryotic.
- In prokaryotic e.g., Cyanophyceae—nucleus is not organized as nuclear membrane is absent.



- DNA fibrils are free in nucleoplasm and are not associated with histones.
- Cell division by mitosis and meiosis is not found. Membrane bound cell organelle like chloroplast, mitochondria and ER are absent.
- Eukaryotic algae have well differentiated nucleus, mitochondria, chloroplast and endoplasmic reticulum in their cell structure.

Nature of Cell Wall Components

- The cell wall in algae is generally made up of polysaccharides.

The inner layer of cell wall in algae is generally made up of cellulose, which is insoluble polysaccharide and the outer layer is made of pectic substances.

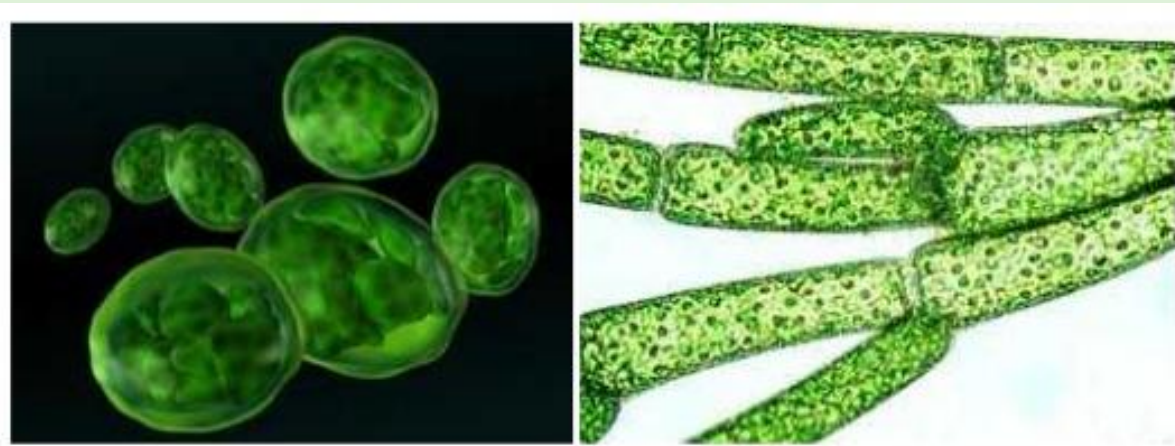
- Modifications: pectic substance common, non-cellulosic which is silicified or calcified, non-cellulosic polysaccharides like xylans and galactans.
- In Cyanophyceae or blue green algae the cell wall is more like bacteria and is made up of mucopeptides.

Pigmentation and Photosynthetic Apparatus

- The pigment is one of the most important criteria used in differentiation of classes in algae, as algae were initially and primarily separated on the basis of colour
- e.g., green algae, red algae, brown algae or blue-green algae.
- The pigments in algae can be chlorophylls, carotenoids and biloproteins.

• Chlorophylls:

- The chlorophylls in algae are chlorophyll a, b, c, d and e types.
- Chlorophyll a is present in all classes of algae.
- Chlorophyll b is primary pigment of chlorophyceae
- Chlorophyll c is found in Phaeophyceae
- Chlorophyll d is found in Rhodophyceae.



carotenoids



- The carotenoids are of two kinds:
Carotenes and Xanthophyll's.
- β carotene is found in all classes of algae.
- α Carotene is found in Rhodophyceae.
- γ Carotene and lycopene are found in Chlorophyceae.
- e Carotene is present in Bacillariophyceae.

There are about 20 types of xanthophyll's commonly found in algae ..

Biloproteins

- The biloproteins are water soluble pigments and can be phycoyanin, phycoerythrin and allophycoyanin.
- These are common only in Rhodophyceae and Cyanophyceae.
- In Rhodophyceae, R-phycoerythrin is the chief pigment and in Cyanophyceae, C-phycoyanin is the chief pigment.



Nature of Reserve Food

- The primary product of photosynthesis i.e., starch is same in all groups of algae but due to accumulation of food over long period the nature of insoluble reserve food may be different.
- The nature of reserve food can be a criterion for distinction of different groups of algae.

- **In Chlorophyceae the reserve food is starch.**
- **In Xanthophyceae oil and leucosine are reserve food materials.**
- **In Rhodophyceae rhodophycean or floridean starch**
- **In Cyanophyceae myxophycean starches are the reserve foods.**
- **In Phaeophyceae the reserve food material is laminarin or mannitol.**

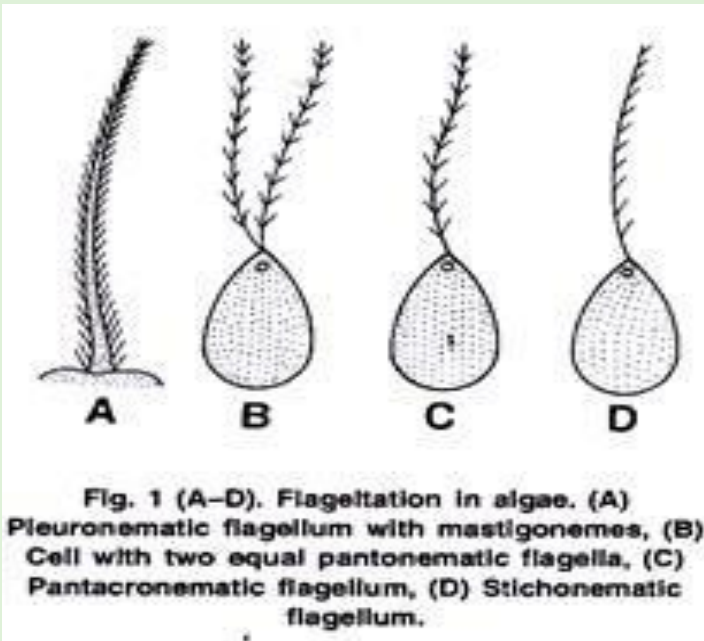
Flagellation

- The type, number and position of flagella are important basis for separation of different classes of algae

In Cyanophyceae and Rhodophyceae flagella are completely absent in vegetative and reproductive structures.

In all other classes the basic flagellar structure is similar.

The flagella have 9 + 2 pattern of component fibrils.



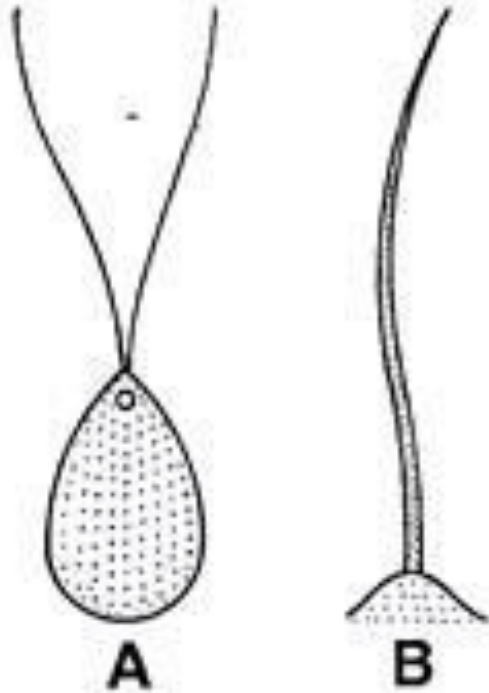


Fig. 2. (A) Equal, biflagellate, acronematic flagella, (B) Single acronematic flagellum.

The flagella can be acronematic or whiplash, pleuronematic or tinsel type.

In Chlorophyceae -4 or indefinite in number, apical or sub-apical in position and acronematic type i.e., isokontic.

In Xanthophyceae - two, unequal apical one acronematic and one pantonematic

In Phaeophyceae - two lateral and unequal in size.

Type of Life Cycle and Reproduction

The presence or absence of sexual reproduction, complexity of reproductive organs, method of sexual reproduction i.e., isogamy, anisogamy and oogamy are important criteria of classification in algae.

Haplontic life cycle, diplontic life cycle and triphasic life cycles are characteristic of different groups.

- For example, sexual reproduction is completely absent in *Cyanophyceae*.
- The reproduction is oogamous and life cycles are usually complex in *Rhodophyceae* and *Phaeophyceae*.
- In *Chlorophyceae* the reproduction can be isogamous, anisogamous and oogamous, the life cycle can be simple or complex.

THANK YOU

This class prepared for
Third Semester BSc Botany Students
Little Flower College, Guruvayur
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Next class
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