

Algae:

It is simple, mostly aquatic, typically autotrophic organisms, ranging from unicellular to multicellular forms. They may be present in colonial or filamentous form. They show great variation in their habitat as still water, running water, fresh water, marine water etc.

The name 'algae' derived from Latin word 'alga' which means 'sea weed'.

The branch of biology which deals about algae is known as phycology.

General Characteristics:

1. They are simplest form of plants.
2. They commonly grow in water. Some are grow on land or on surface of the higher plants.
3. The plant body is not differentiated into root, stem and leaves. Hence are called thallus.
4. They are generally multicellular. The vegetative body is filamentous in form. Some are unicellular. eg: *Chlamydomonas*.
5. Cell wall is made up of cellulose.
6. Chlorophyll and accessory pigments are present. Hence, they are autotrophic.
7. Reserve food material is starch.
8. Vascular tissues are absent.
9. Gametophyte is the dominant phase of life cycle.

Classification:

Fritsch (1935) classified the algae into 11 different classes. Among them, the characteristics of some are discussed below.

1. Chlorophyceae:

- a. Mostly they are fresh water form. Some are marine form.
- b. Cell wall is made up of outer pectin and inner cellulose.
- c. Photosynthetic pigments chl. a, chl. b, carotenes and xanthophylls are found.
- d. They are green in colour. Hence, are called green algae.
- e. Reserve food material is starch.

2. Phaeophyceae:

- a. Mostly they are marine form.
- b. Cell wall is made up of outer phycocolloids and inner cellulose.
- c. Photosynthetic pigments chl. a, chl. c and carotenes are found. There is also found fucoxanthin.
- d. Due to fucoxanthin, they are brown in colour. Hence, are called brown algae.
- e. Reserve food material is laminarian starch and mannitol.

3. Rhodophyceae:

- a. Mostly they are marine form.
- b. Cell wall is made up of outer pectin and inner cellulose.
- c. Photosynthetic pigments chl. a, chl. d, carotenes and xanthophylls are found. There is also found phycoyanine and phycoerythrine.
- d. Due to the pigments, they are red in colour. Hence, are called red algae.
- e. Reserve food material is floridean starch.

Spirogyra:

It is very common free-floating green algae. It is commonly found in pool, ponds, lakes etc. It is long filamentous form surrounded by mucilaginous substance. Hence, it is commonly called 'pond scum', 'water silk' or 'pond silk'.

It is thallus in structure having long filament. The filament is unbranched. It contains many cells placed end to end. The cells present in filaments are cylindrical and alike in their structure.

Each cell of filament is externally covered by double layered wall. The outer wall is made up of pectin and an inner is cellulose. Pectin substance dissolves into water to form slimy layer. The adjacent cells of filament are separated by transverse septa.

The cell contains a prominent nucleus almost at the centre. Nucleus produces a number of protoplasmic strands. Hence, it is stellate shaped. Chlorophylls are ribbon like spirally arranged. There is present proteinous body as pyrenoids at regular interval in the chloroplast which stores starch.

Figure:

Reproduction:

It takes place by following methods.

1. **Vegetative reproduction:** It generally takes place by fragmentation which occurs in favourable condition. The vegetative filaments break into many small fragments. The formation of fragments is known as fragmentation. It may result due to various reasons as mechanical injury, environmental change, death and decay of intercalary cells etc. Each fragment develops into a new filament.

Figure:

2. **Asexual reproduction:** It generally takes place by different methods which occur in unfavourable condition.

- a. **Akinetes:** It is thick walled resting spore with abundant stored food materials. Akinetes are form when the cellular protoplast round off and the cell wall serves as the spore wall. The wall becomes thick with the formation of thick layers around it. After return of favourable condition, it starts to germinate to produce new filament.

Figure:

- b. Aplanospore:** It is thin walled non-motile spores that form singly inside a cell. The protoplast round off and secrete a thin wall around it to form aplanospore. On return of favourable conditions, it germinates to produce new filament.

Figure:

- c. Parthenospore:** It occurs when gametes fail to fuse. They develop thick wall around and form parthenospore. It germinates and produce new filament during favourable condition.

Figure:

- 3. Sexual reproduction:** It occurs by conjugation which is again two types.

- a. Scalariform conjugation:** It is common type of conjugation where two filaments take part. The two filaments lie side by side and hold by the mucilaginous sheath. The cells lie opposite side produce small outgrowth which finally touches each other. The terminal walls then dissolve and form conjugation tube. Then these two cells of opposite filament acts as gametangia. The cells of one filament pass into the opposite cell, through conjugation tube. These two gametangia then fuse and form the wall around the zygote. They are called zygospore.

Then the zygospore is released from the thallus and lies at the bottom. It remains as dormant condition. The nucleus divided meiotically to produce four haploid nuclei. Among them, three are degenerate and only one nucleus is functional which is known as functional zygospore. After returning the favourable condition, the wall of zygospore is rupture and grows out small germ cell. It starts to divide mitotically to produce new filament.

Figure:

- b. Lateral conjugation:** The conjugation that occurs in adjacent cells of same filament is called lateral conjugation. It is also called chain conjugation.

Figure:

Economic Importance of Algae:

1. As they contain high amount of carbohydrates, proteins, fats and vitamins A, B, C and E, they are used as food by humans in different part of world.
2. Being consists of various nutrients, they are also used as fodder for domestic animals.
3. Some red and brown algae are used as fertilizer.
4. They are chief producers for aquatic ecosystem.
5. Different laboratory reagents like, agar-agar, algin, mannitol, fucoidin are manufacture by using different red and brown algae.
6. Different species of algae are used to decompose waste and sewage.