

CC 1 : BIODIVERSITY (Microbes, Algae, Fungi and Archeogonate)

UNIT – 2

Algae
(Part 7)

Classification of Algae by Robert Edward Lee (1989) :

Robert Edward Lee classified the algae into four evolutionary groups, 15 divisions and classes based on the evolutionary features. (“Phycology” by R. E. Lee, 1989, 2nd Edn.)

The basis of classification includes :

- a. Presence or absence of proper chloroplast,
- b. Nature of ribosomes,
- c. Content of primary photosynthetic pigment,
- d. Presence or absence of phycobilliproteins,
- e. Number of the membrane of chloroplast and its nature,
- f. Type of reserve food material,
- g. Number of flagella and their position.

The classification is as follows –

Group 1. Prokaryotic algae.

The prokaryotic algae have outer plasma membrane enclosing protoplasm –

- (i) Containing photosynthetic thylakoids,
- (ii) 70s ribosomes,
- (iii) DNA fibrils not enclosed within a separated membrane,
- (iv) Chlorophyll a is the main photosynthetic pigment.

Group 2. Eukaryotic algae with chloroplast surrounded only by the two membranes of the chloroplast envelope.

Group 3. Eukaryotic algae with chloroplast surrounded by one membrane of chloroplast endoplasmic reticulum.

Group 4. Eukaryotic algae with chloroplast surrounded by two membranes of chloroplast endoplasmic reticulum.

Characteristics	Cyanophyceae	Rhodophyceae	Chlorophyceae	Bacillariophyceae	Xanthophyceae	Pheophyceae
Cell structure	Prokaryotic	Eukaryotic	Eukaryotic	Eukaryotic	Eukaryotic	Eukaryotic
Cell wall	Mainly mucopeptide and muramic acid	Inner layer cellulosic and outer pectic.	Mainly cellulosic and pectic material.	Mainly silica and pectic material.	Cellulosic.	Inner layer cellulosic and outer layer consists of alginic and fusicinic acid.
Flagella	Non-flagellate.	Non-flagellate.	Motile cells have 2, 4 or more flagella, whiplash type and anteriorly inserted.	Motile cells have 1 or sometimes 2 tinsel type and anteriorly inserted.	Motile forms have 2 flagella, unequal, 1 tinsel and 1 whiplash.	Motile forms have 2 flagella, unequal, 1 tinsel and 1 whiplash, laterally inserted.
Green pigments	Chlorophyll a.	Chlorophyll a and d.	Chlorophyll a and b.	Chlorophyll a and c.	Chlorophyll a and e.	Chlorophyll a and c.
Other pigments	c-phycoerythrin (blue), c-phycoerythrin (red), β -carotene, myxoxanthin, myxoxanthophyll.	r-phycoerythrin, α and β -carotene, xanthophylls (lutein, tetraaxanthin etc.).	α and β -carotene, and xanthophylls.	β -carotene, xanthophylls (fucoxanthin).	β -carotene and xanthophylls.	β -carotene, xanthophylls (fucoxanthin).
Nature of nucleus	Nuclear membrane and nucleolus absent. DNA is not associated with histones, thereby chromosomes are not formed.	Nucleus well organized and chromosome formed during cell division.	Nucleus well organized and chromosome formed during cell division.	Nucleus well organized and chromosome formed during cell division.	Nucleus well organized and chromosome formed during cell division.	Nucleus well organized and chromosome formed during cell division.
Stored food	Cyanophycean starch and cyanophycean protein.	Floridean starch.	Starch and fat.	Oil, volutin, chrysolaminarin.	Oil, lipid and lucosin.	Laminarin, mannitol and sucrose.