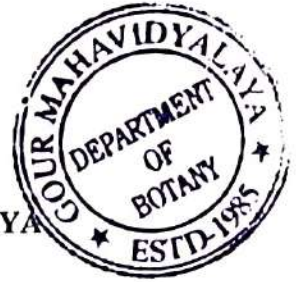


**STUDY MATERIALS FOR ALGAE**  
**DEPARTMENT OF BOTANY, GOUR MAHAVIDYALAYA**



**Evolutionary classification of Lee, 2008 (upto groups)**

There are four distinct groups within the algae. **1. Prokaryotes.** The cyanobacteria are the only prokaryotic algae. **2. Eukaryotic algae with chloroplasts surrounded by the two membranes of the chloroplast envelope.** **3. Eukaryotic algae with the chloroplast surrounded by one membrane of chloroplast endoplasmic reticulum.** **4. Eukaryotic algae with the chloroplast surrounded by two membranes of chloroplast endoplasmic reticulum.**

**Group 1 Prokaryotic algae**

Cyanophyta (cyanobacteria): chlorophyll a; phycobiliproteins.

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

**Glaucophyta:** algae that represent an intermediate position in the evolution of chloroplasts; photosynthesis is carried out by modified endosymbiotic cyanobacteria.

**Rhodophyta (red algae):** chlorophyll a; phycobiliproteins; no flagellated cells; storage product is floridean starch.

**Chlorophyta (green algae):** chlorophylls a and b; storage product, starch, is found inside the chloroplast.

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

**Euglenophyta (euglenoids):** chlorophylls a and b; one flagellum with a spiraled row of fibrillar hairs; proteinaceous pellicle in strips under the plasma membrane; storage product is paramylon; characteristic type of cell division.

**Dinophyta (dinoflagellates):**

mesokaryotic nucleus; chlorophylls a and c1; cell commonly divided into an epicone and a hypocone by a girdle; helical transverse flagellum; thecal plates in vesicles under the plasma membrane.

**Apicomplexa:** heterotrophic flagellates with colorless plastids.

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

**Cryptophyta (cryptophytes):** nucleomorph present between inner and outer membrane of chloroplast endoplasmic reticulum; starch formed as grains between inner membrane of chloroplast endoplasmic reticulum and chloroplast envelope; chlorophyll a and c; phycobiliproteins; periplast inside plasma membrane.

**Heterokontophyta (heterokonts):** anterior tinsel and posterior whiplash flagellum; chlorophyll a and c; fucoxanthin; storage product usually chrysolaminarin occurring in vesicles.

**Chrysophyceae** (golden-brown algae)

**Synurophyceae**

**Eustigmatophyceae**

**Pinguiophyceae**

**Dictyochophyceae** (silicoflagellates)

**Pelagophyceae**

**Bolidophyceae**

**Bacillariophyceae**(diatoms)

**Raphidophyceae** (chloromonads)

**Xanthophyceae** (yellow-green algae)

**Phaeothamniophyceae**

**Phaeophyceae** (brown algae)

**Prymnesiophyta** (haptophytes): two whiplash flagella; haptonema present; chlorophyll a and c; fucoxanthin; scales common outside cell; storage product chrysolaminarin occurring in vesicles.



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