

CC 1 : PHYCOLOGY

UNIT – 6

Charophyta & Prochloron
(Part 2)

General Characteristics :

1. The **cells are eukaryotic** in nature.
2. Commonly they are found in **fresh water** with muddy or sandy bottom and also in water folwing over limestone.
3. Plants are **macroscopic**, much branched, and erect and commonly attains up to 30 cm in length.
4. The plants are differentiated into **nodes and internodes**. Some of the nodes bear **branches of unlimited growth**, these are again divided into nodes and internodes. Each node of the main axis and branches of unlimited growth bear a number of **branches of limited growth**. Most of the species show **cortication** in the internodes. The cortex consists of vertically elongated row of cells.
5. The **cell wall** is mainly made up of **cellulose**.
6. **Flegella are two, equal in size, whiplash type and laterally inserted**.
7. The main pigment is **chlorophyll-a** and **chlorophyll-b**. **α -carotene** and **β -carotene** are present as accessory pigments. **Phycobilins are absent**.
8. The **reserve food is starch**.
9. They **reproduce by means of vegetative and sexual** reproduction. The zygote or oospore is only diploid structure in their life cycle. Sexual reproduction is highly **advanced oogamous type**.
10. The male and female reproductive bodies are **globule** and **nucule** respectively. Globule develops many antherozoids and nucule contains only one egg.

Evolutionary significance of *Prochloron* :

The discovery of *Prochloron* was exciting as it was thought to be the **ancestor of the chloroplasts of green algae and land plants**, sharing with them the presence of **chlorophyll a and b and stacked thylakoids but no phycobilins**. This **oxygenic photosynthetic cyanobacterium** lives in **obligate symbiosis** with colonial ascidians inhabiting tropical/subtropical waters and free-living *Prochloron* cells have never been recorded so far.

1. *Prochloron* (meaning 'primitive green thing') is a **green cyanophyte** and it has **chlorophyll a and b and stacked thylakoids but no phycobilins**.
2. This marine, coccoid Cyanophycean alga **live as extracellular symbionts** within tropical and subtropical colonial ascidians (sea-squirts).
3. *Prochloron* was **thought to represent the missing link between prokaryotic algae and green chloroplasts**.
4. To understand the evolutionary significance of *Prochloron* DNA-DNA hybridization, analysis of the DNA-dependant RNA polymerase gene and comparing 16S rRNA gene were done.
5. Molecular phylogeny studies have **not supported the close relationship** between *Prochloron* and the chloroplasts of green. *Prochloron* and the other prochlorophytes are usually attributed to the members of the division Cyanobacteria in recent years, supposing that **chlorophyll b developed independently** in chlorophytes and prochlorophytes.
6. Phylogenetic analysis demonstrated that the prochlorophytes are a polyphyletic group within the cyanobacterial radiation, supporting the view that the **ability to synthesize chlorophyll b evolved several times separately with consequent loss of the ability to synthesize phycobilins**.