

Cyanophyceae

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► Features:

- Commonly known as Blue-Green Algae (BGA), Cyanobacteria
- Distributed from tropics to polar region, marine to fresh water, from plain to top of mountains, from cold to hot spring ($\sim 85^{\circ}\text{C}$)
- Best develop in stagnant water, give the water green and/or yellow-green colour
- Causes water blooms/algal blooms and bioluminescence
- Some members fix atmospheric nitrogen
- unicellular, colonial to filamentous unbranched, falsely branched and branched forms
- Free living, symbionts, mild parasite



Harmful Algal Blooms (HABs)

► Cell Structure:

- Prokaryotic cells – simple internal structure
- Golgi body, mitochondria, and endoplasmic reticulum are absent
- True sexuality absent
- Flagella absent

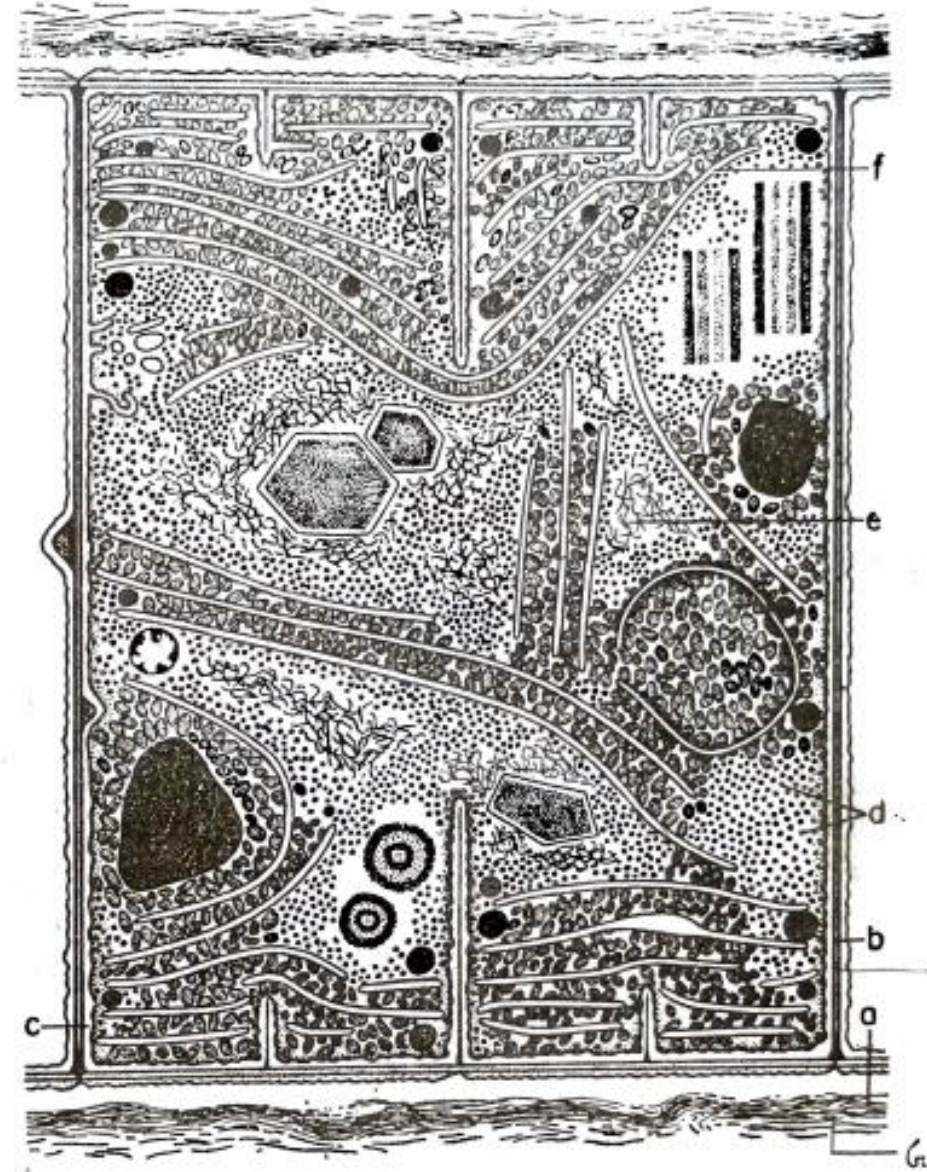


Fig. 18. Diagrammatic presentation of blue-green algal cell structure. a. Gelatinous sheath. b. Cell wall. c. Plasmalemma. d. Ribosomes. e. Nuclear material. f. Thylakoid.

► **Protoplast:**

- Protoplast with highly viscous jelly-like substance
- Proteinaceous compound cyanophycin present
- Vacuoles present only in old cells. Pseudo-vacuole and gas-vacuole may be present which help to float in water

► Chloroplast

- Chloroplast without membrane
- Thylakoids lie free in cytoplasm, distributed irregularly or arranged in parallel sacks, generally present to the periphery

► Pigments:

- Present on thylakoids
- Chlorophyll a. And accessory pigments – Phycobillin
- Phycobillin – c-phycoyanin (blue), c-allophycoyanin (blue), and c-phycoerythrin (red)

► Nuclear Material:

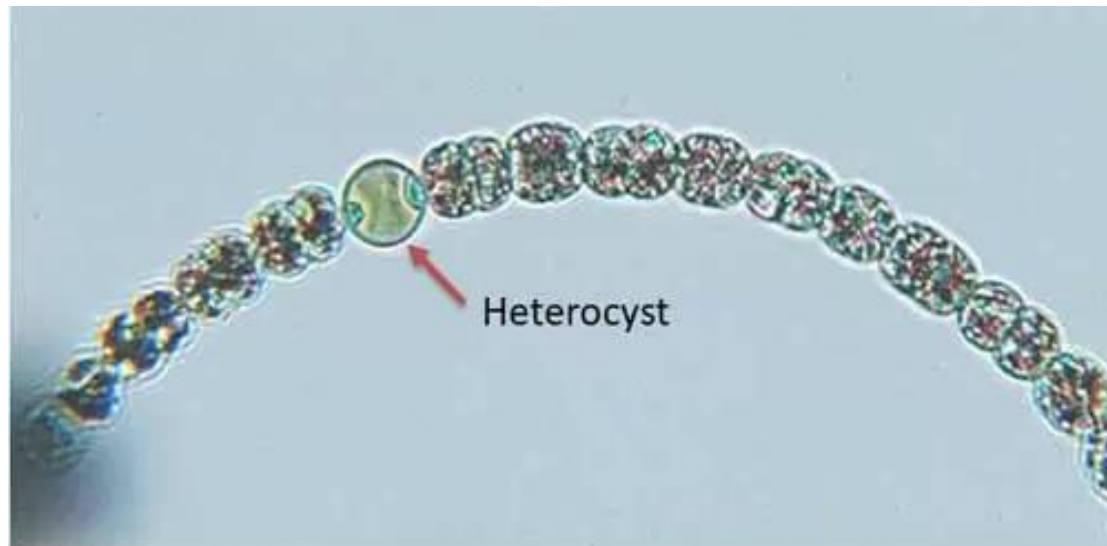
- Unorganised nuclei, *i.e.* without nuclear membrane and nucleolus
- DNA in fine fibrils
- Distributed throughout the cell or concentrated in the central portion
- Histone proteins absent, that is why organized chromosomes absent

► Storage Food

- Cyanophycean starch and proteins
- Oils
- Diaminopimelic acid, an amino acid, found in some proteins, found in some bacteria, but not in higher plants or animal

► Nitrogen Fixation

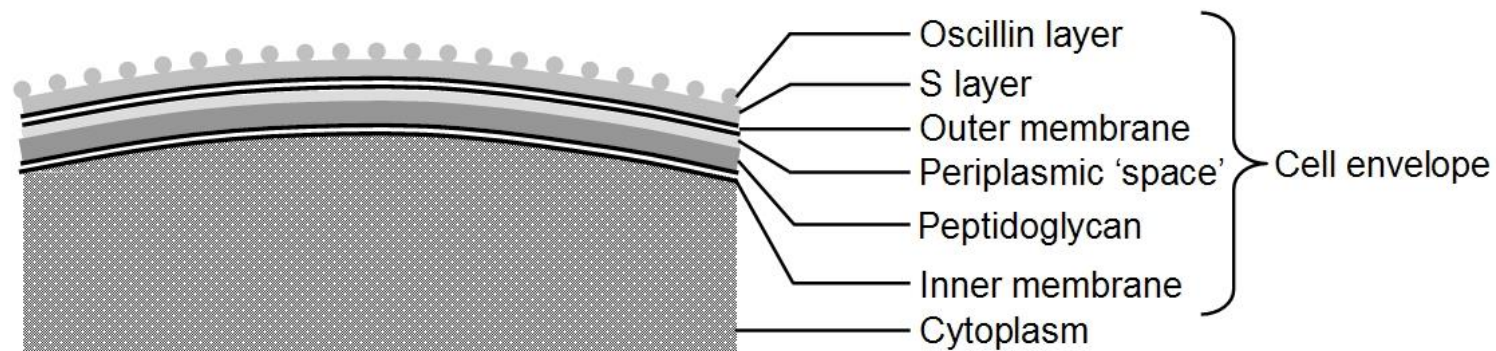
- Certain blue-green algae can assimilate atmospheric gaseous nitrogen
- Three kinds of blue-green algae can fix nitrogen (1) the filamentous heterocystous species – heterocyst as nitrogen fixation site, (2) certain nonheterocystous filamentous species, and (3) certain unicellular (nonheterocystous) species



Heterocyst of Anabaena

► Cell Wall

- Cells have a surface layer of gelatinous sheath
- Sheath have cellulose fibrils reticularly and homogenously arranged
- Multilayered structure
- The inner layer of the cell wall has mucopeptide component as in bacterial cell walls
- Ingrowth of cell wall take places to form septum for division of cells



► **Reproduction**

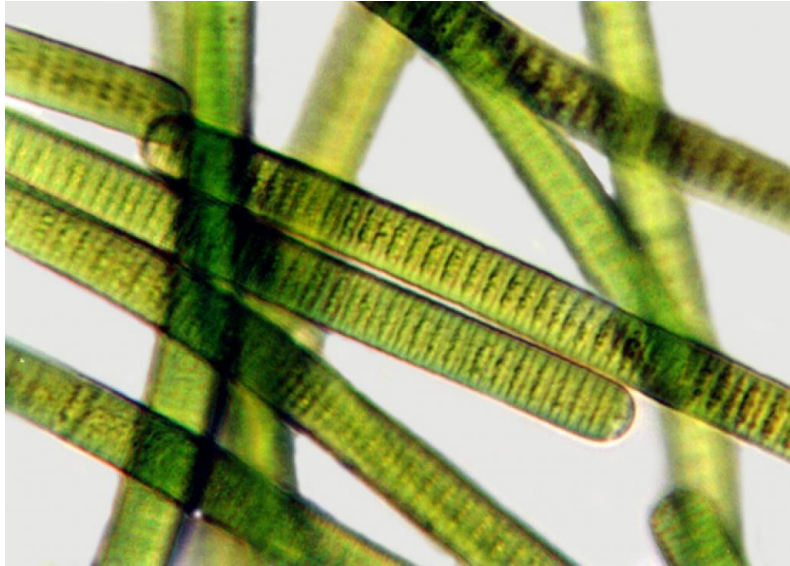
- Complete absence of sexual reproduction
- Vegetative reproduction by simple division or fragmentation
- Asexual reproduction by spores, akinetes, endospores, exospores, hormospores, etc.
- Genetic recombination, a parasexual phenomenon, found in some species

▶ Similarity with Bacteria

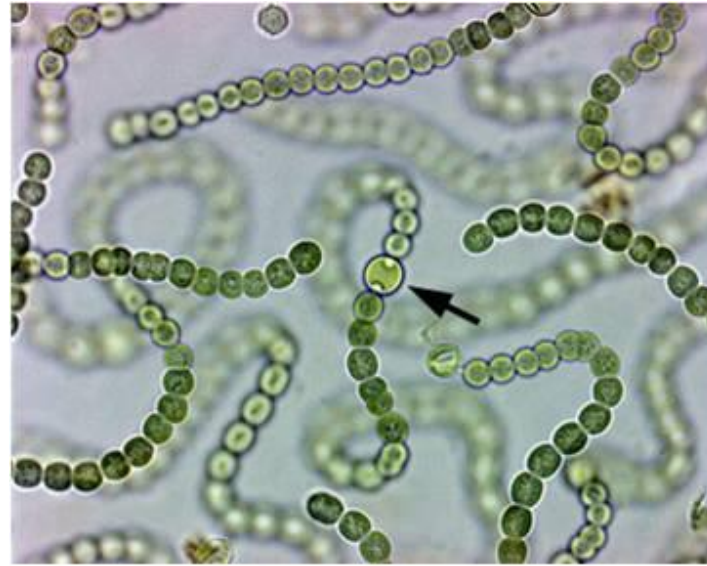
- Procaryotic cells
- Absence of true sexual reproduction
- Diaminopimelic acid present
- Very simple body cover with sheath
- Withstand at high temperature
- Cyanophages can infect Cyanophyceae
- Genetic recombination process

► Example:

- *Oscillatoria*, *Nostoc*, *Anabaena*, *Rivularia*, etc.



Oscillatoria



Nostoc