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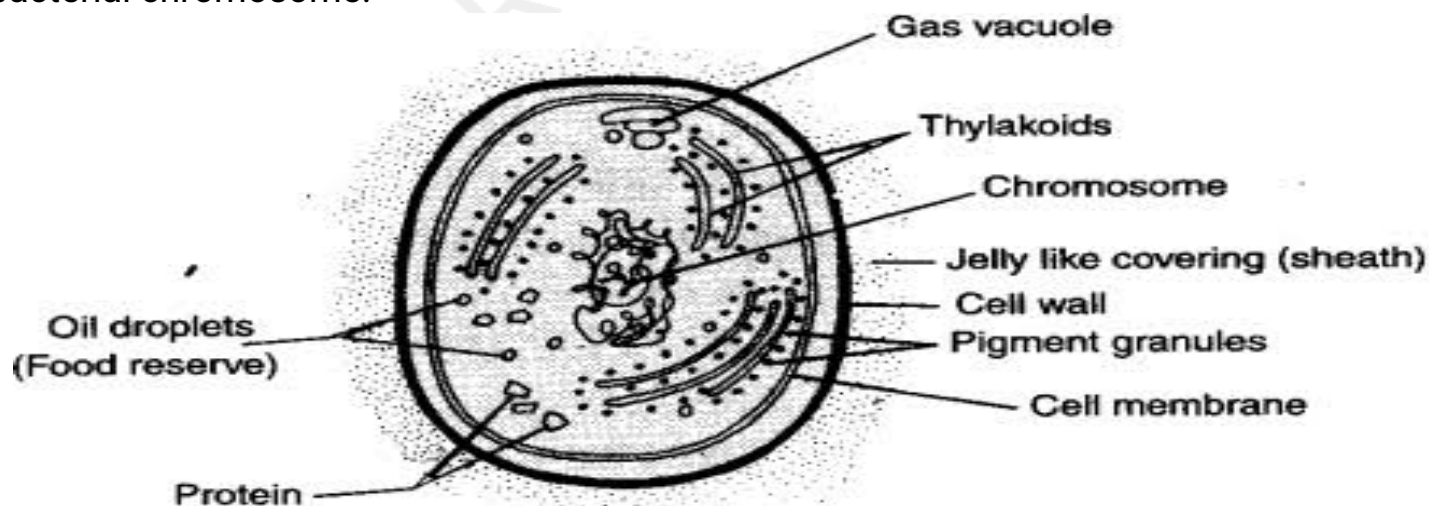
CORE CONCEPT OF
Microbiology

CYANOBACTERIA

They are gram -ve, photosynthetic, single celled or colonial or filamentous bacteria often called as blue green algae. They are known to inhabit the extreme environmental conditions such as hot springs or icebergs . They are the most successful group of oxygenic photosynthetic organisms found on earth.

STRUCTURE. A cyanobacteria cell is usually larger than a normal bacteria cell. Cell wall is made up of peptidoglycan. Photosynthetic lamellae or thylakoids are present which photosynthetic pigments *viz.* chlorophyll-a, Beta-carotene, c-phycoyanin (blue pigment) and c-phycoerythrin (red pigment). The cyanobacteria are more blue than green they have excess of phycoyanin.

Other substances like fat droplets and protein crystals are also present in the cell. Gas vacuoles are also present that help them to float in water. Its chromosome is similar to that of bacterial chromosome.



**Fig. Structure of a cyanobacterial cell :
Revealed by Electron Microscope**

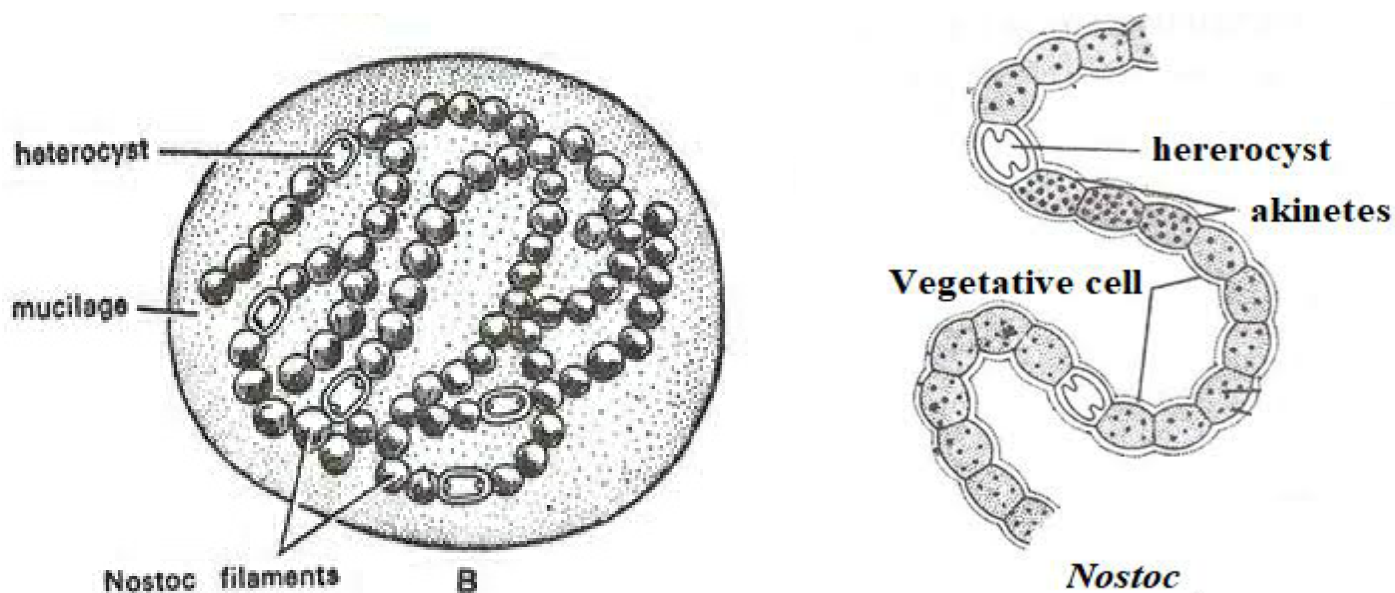


Fig. 1. (i) NOSTOC COLONY

(ii) FILAMENT SHOWING HETEROCYST

Like other green plants, cyanobacteria show oxygenic photosynthesis. Some cyanobacterial cells are specialized or differentiated to have special functions like the **heterocyst** in *Nostoc* (Fig. 1.) acts as the site of nitrogen fixation, and **akinetes** are highly thick-walled modified vegetative cells which help in perennation and vegetative reproduction.

In *Oscillatoria*, the filament represents a colony known as trichome and each cell of the filament is independent.

Cyanobacteria reproduce by binary fission (in unicellular forms), or by breaking up of the filament into **hormogonium** e.g. in *Oscillatoria* and *Nostoc* (Fig. 2.).

Hormogonia are multicellular fragments of a filament formed due to death of intercalary cells. Each hormogonium becomes thick-walled, it is called **hormocyst** which helps in perennation and reproduction.

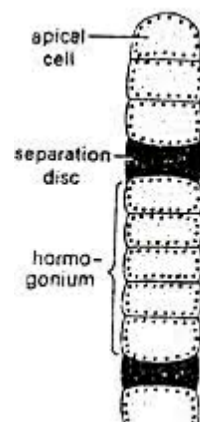


Fig. 2. *Oscillatoria* filament showing hormogonium for reproduction



Cyanobacteria also lack sexual reproduction but they are known to exhibit genetic recombination by transformation, transduction and conjugation.

Some cyanobacteria release toxins which are harmful to aquatic forms of life. These toxins are also poisonous to man. A cyanobacterium, *Spirulina* is non-toxic and may be cultivated in tanks as a protein rich animal feed.

ECONOMIC IMPORTANCE OF CYANOBACTERIA

1. Like other plants, they can also photosynthesize. Thus they are the producers of the biosphere. They are the most self contained autotrophs. *Unlike bacteria, they have oxygenic photosynthesis.*

2. Many forms of cyanobacteria can fix nitrogen of the atmosphere into ammonium compounds. Cyanobacteria nitrogen fixation enriches plant roots in many wet land conditions such as in the rice fields. Cyanobacteria that can fix the nitrogen of the atmosphere are *Anabaena*, *Nostoc*, *Aulosira* and *Tolypothrix*.

3. Some cyanobacteria release toxins which are harmful to the aquatic forms of life. These toxins are also poisonous to man.

4. A non-toxic and fast growing cyanobacterium called *Spirulina* (Fig. 3.) may be cultivated in tanks as a protein rich animal feed.

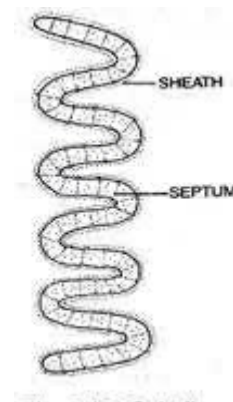


Fig. 3. Spirulina

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