

Subject-Botany

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Paper-2 (Diversity of Algae, Lichen and Bryophyte)

Topic- Cynobacterial cell

Cyanobacteria Structure Classification and Reproduction

The Cyanobacteria are the largest and most diverse group of photosynthetic bacteria. They were previously known as **blue green algae**. They show following characteristics:

Cell type: They are true prokaryotes. They lack true nucleus and nuclear membrane.

Size and Shape: They vary greatly in size and shape. They range in diameter from 1 to 10 μm .

Vegetative structure: They may be unicellular or form colonies of different shapes or form filaments. The filament is composed of trichomes. **Trichome is a chain of cell**. Each filament is surrounded by mucilaginous sheath. A trichome with its enclosing sheath is called filament. Trichome may be branched or unbranched. **Locomotion:** They lack flagella. They use gas vesicle to move in the water. Many filamentous species show gliding movements. Some filaments shift their position laterally in water.

cell structure: Cell has following parts:

1. Cell wall and mucilaginous sheath:

They have primitive cell types. Cell is surrounded by cell wall. Cell wall is composed of cellulose and pectic substances. Mucilage form sheath around the cell. Sheath increases the water holding capacity of cell. The colour of sheath protects the cell from strong light.

2. Protoplast: Protoplast is divided into two parts:

(a) Centroplasm:

The central region is colourless called centroplasm. Centroplasm has central body. It contains chromatin material. Nuclear material is not present in the form of chromosome. It is present in the form of crystalline granules. It may be called **primitive nucleus**. But it lack nuclear membrane and nucleolus.

(b) Chromoplasm:

The outer region is blue green pigmented. It is called **chromoplasm**. Chromoplasm contain pigments chlorophyll, carotene, myxothanophyll and phycocyanin. It also contains oil droplets and glycogen. Certain gas vesicles are also present in it.

3. Photosynthetic system:

Their photosynthetic system is closely resembled to the eukaryotes. They have chlorophyll and **photosystem II**. They use water as electron donor. They release oxygen during photosynthesis. Therefore, they carry out **oxygenic photosynthesis**. They use **phycobilins** as accessory pigments. Photosynthetic pigments and electron transport chain components are located within the thylakoid membrane. These pigments are linked with particles **phycobilisomes**. A blue pigment **Phycocyanin** is their predominant phycobilins. Cyanobacteria fix CO₂ through the Calvin Cycle.

4. Heterocysts:

The filaments of some cyanobacteria have special cells called heterocysts. They are enlarged barrel shaped cells. There are different views about the nature of heterocysts. According to one view, they are vestigial spores. According to second view heterocysts have role in nitrogen fixation.

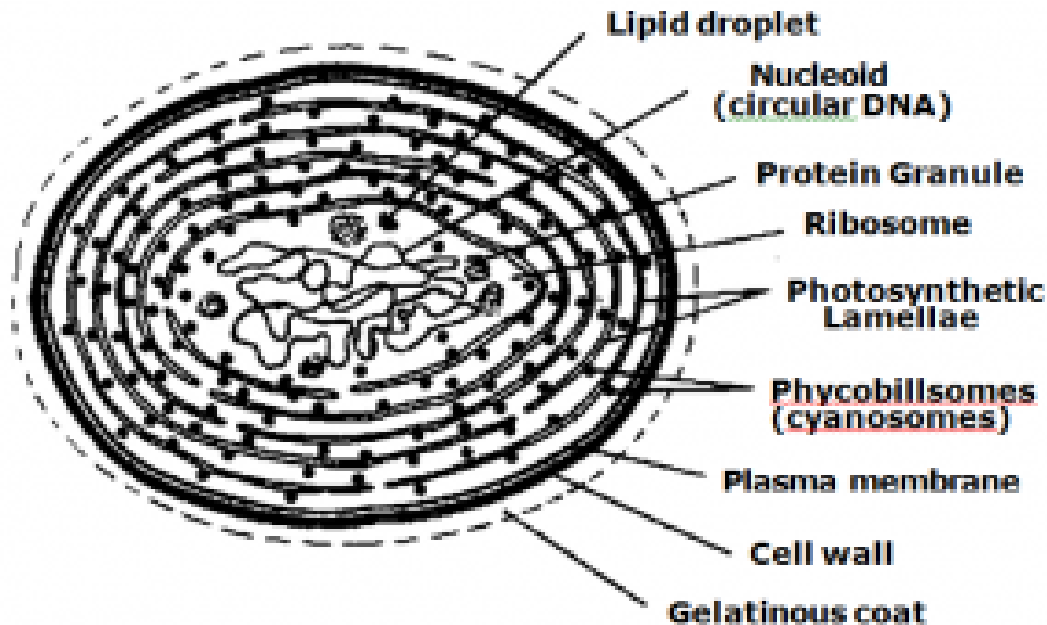


Fig: Cell of Cyanobacteria

Reproduction

Sexual reproduction is **completely absent** in cyanobacteria. It reproduces **asexually** by following methods:

(a) .Binary fission:

It is a simple cell division. The genetic material replicates. They move to opposite poles. A ring like outgrowth appears in the middle of the cell. It divides the cell into two.

(b). Fragmentation:

The filament of the cyanobacteria breaks to form small fragments. Each filament grows to form new colony.

(c).Hormogonia:

The broken pieces of a filament are called hormogonia. Double concave discs of gelatinous material are formed between two cells. It is called separation disc. The filaments break at these points and form hormogonia.

(d).Hormospores:

Under unfavourable conditions, some hormogonia develop thick wall. They are called hormospores. They germinate directly into new filament in favorable conditions.

(e) Plancocci:

These are single celled hormongones. They show . creeping movements. Plancocci develop new colony.

Spore formation: There are following types of spores:

1.Akinetes or arthrospores:

Akinetes are thick walled, enlarge reproductive cells. The cell stores reserve food and enlarans. It secretes thick wall and become akinete. Akinete has outer wall exospore and inner wall endospore. They are yellow or brown coloured. The• akinete germinate immediately after raining.

2.Endospores:

Some cyanobacteria develop endospores. The protoplast of certain cells divides and develops endospores. The old cell wall burst and endospores come out.

3.Exospores:

They are cut out at the tip of some branches. They get separated and develop new filament.