

Magadh University, Bodh Gaya

Online classes

Kishori Sinha Mahila College,
Aurangabad, (Bihar)

Department of Botany

Date - 20-04-2020

For B.Sc. I. (Subsidiary)

Chapter - Nostoc (Algae)

Systematic Position:-

Division - Cyanophyta

Class - Cyanophyceae

Tribe - Hormogoneae

Order - Nostocales

Family - Nostocaceae

Genus - Nostoc

Habit & Habitat:-

It is an unbranched filamentous colonial fresh water alga found in ponds, pools. They are generally free floating but some species are found attached to submerged vegetation. The colonies ~~are~~ have firm matrix of gelatinous material in which trichomes (filaments) are tangled. ~~In size~~ Colonies are of various sizes and shapes e.g. microscopic, pea size, or larger and may be ball like or of irregular shape. Nostoc also found in symbiotic association with fungi to form lichen. Certain species of Nostoc are found in the Thalli of Anthoceros. Some species of Nostoc have been reported to fix atmospheric nitrogen and tend to maintain fertility of paddy fields. Terrestrial species e.g. Nostoc commune grow on damp soil.

Structure of Colony:-

A large number of trichomes ~~are~~ of different lengths are tangled in a gelatinous matrix to form a colony. Each trichome is usually enclosed or covered by its own mucilaginous sheath and is called trichome. ~~Structure is as follows~~

Structure of the trichome :-

Each trichome is made up a chain of round or oval cells ~~which are~~ in a single row showing end to end arrangement. The trichome is as such unbranched and filamentous. Each trichome is covered with its own mucilaginous sheath called a filament. It means A filament without its mucilaginous sheath is called a trichome and a trichome with its mucilaginous sheath is called a filament.

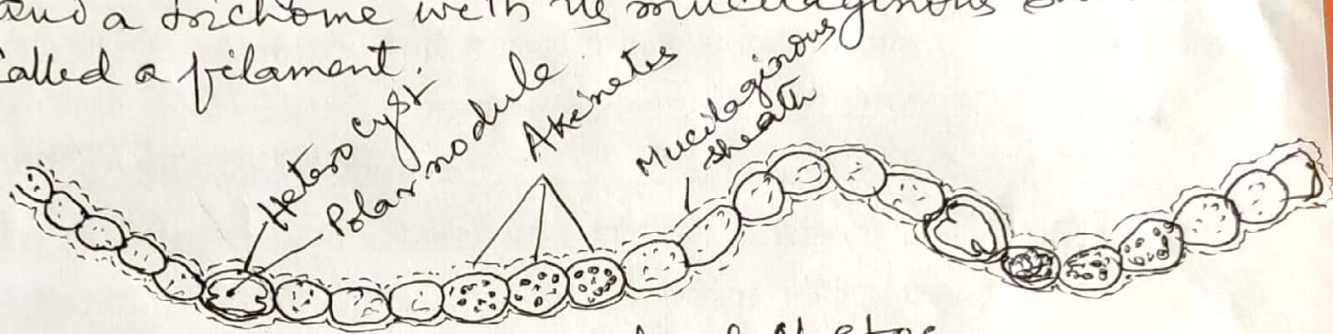


Fig:- A filament of Nostoc.

Here and there on the trichome there are found some colourless, spherical or barrel shaped cells are found ~~the~~ called heterocysts. They are slightly larger and thicker than normal vegetative cells which are rounded or oval. Each intercalary heterocyst has two polar pores. Through these pores cytoplasmic connections are ~~found~~ maintained with the adjacent vegetative cells. Each pore is covered with a polar nodule. Under certain conditions some vegetative cells are enlarged and are stored with food materials. They are called akinetes.

Cell structure :- The cell of Nostoc (Normal vegetative) cell shows the structure of typical blue green algal cell i.e. prokaryotic ~~with~~ ^{without} membrane bound cell organelles like Mitochondria, Endoplasmic reticulum, lysosome, Golgi Complex, lysosome etc. which are lacking. Only 70S ribosomes are found, Membrane bound nucleus with nucleoli are absent. Only central

colourless zone is found called Centrioplasm having genetic material i.e. D.N.A. Chromosome like structures are not formed at any stage. Pigments (Chlorophylla, C-Phycocyanin, C-phycoerythrin, Carotenoids) are found in peripheral region called chromoplasm.

Reproduction: - Sexual reproduction is entirely absent. Nostoc only reproduces by vegetative reproduction.

1. Colony fragmentation: - When the Nostoc colony increases in size it breaks up in to small segments. Each segment grows up to the normal size of the colony.

2. Homogonia: - It is a very common method of reproduction in Nostoc. The trichome ruptures at places where the heterocyst and vegetative cell adjoin. This junction is the weakest link in the chain. In this way short segments of living cells called the homogonia are formed. The homogonia become isolated and slip out of the gelatinous matrix and grow in to new colony by repeated divisions. Sometimes they develop in to new trichomes without being liberated from the colonial sheath and increase the number of trichomes in the ~~parent~~ adult colony.



Fig. Homogonium of Nostoc.

3. Resting spores or Akinetes: - Under certain conditions any cell or some of the vegetative cells of the trichome become enlarged and each secretes a thick highly resistant wall around it. They are filled with reserve food materials. Such specially modified vegetative cells are called the resting spores or akinetes. They are well adapted to survive unfavourable conditions. With the return of favourable conditions each akinete germinates to form a new filament of Nostoc.

4. By Heterocyst: - In N. commune the heterocyst may become functional. It germinates to form a new filament. At first a 2-celled and later a 4-celled gemling is formed. It escapes by either by the rupture of heterocyst wall at the equatorial region or by gradual dissolution and widening of the pore.

5. Endospore formation: - Brand (1901) and Spcott (1911) reported that the content of the heterocyst of Nostoc commune and N. microscopium divide to produce endospores which on liberation give rise to new filaments.

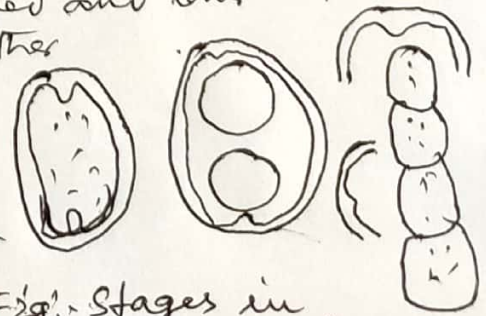


Fig. Stages in germination of heterocyst of Nostoc.

_____ The end _____