Cyanophyceae

Introduction: It is a primitive group of Algae, commonly known as Blue-green algae or myxophyceae.

Important characteristics of Cyanophyceae :-

- The individual cells are prokaryotic in nature.
- Both vegetative & reproductive cells are non-flagellated.
- Cell wall is composed of mucopeptide along with carbohydrate, amino acids & fatty acids.
- Locomotion is generally absent but when occurs, it is of gliding or jerky type.

The principal pigments are :-

→ Chlorophyll-a
→ C-phycocyanin
→ C-Phycoerythrin
→ β-carotene and different Xanthophylls.

→ The reserve food materials are Cyanophycean starch & Cyanophycean granules.

→ Many filamentous members posses specialized cells known as heterocysts (N_2 fixation).

→ Reproduction takes place by vegetative & asexual methods

→ Vegetative reproduction takes place by endospores, exospores, akinetes, nannospores.

→ Sexual reproduction is commonly -nt.

Occurrence of Cyanophyceae :

→ Members of cyanophyceae are available in different habitats.

→ Most of them are fresh water.
ex - Oscillatoria, Rivularia.

→ few marine, ex - Trichodesmium, Darmocarpa.

→ Nostoc have terrestrial habitat.

Note : Some members like Anabaena grow as endophytes in thallus of Anthoceros (Bryophyta)

→ Nostoc also found in root of cycas.

Notes:

→ Some members do symbiotic association with fungi & forms Lichens (Algae + fungi)

→ Some members like Nostoc & Anabaena can fix atmospheric nitrogen and increase soil fertility.

Thallus Organisation in Cyanophyceae

Plants of this group show much variation in their thallus organisation.

1) Unicellular form :

Cell may be oval or spherical.
ex : Gloeocapsa & Chroococcus.

2) Colonial form :

In most of the members the cells after division remain attached by their cell wall or remain together in a common gelatinous matrix called as colony.

The colony may be of two types :-

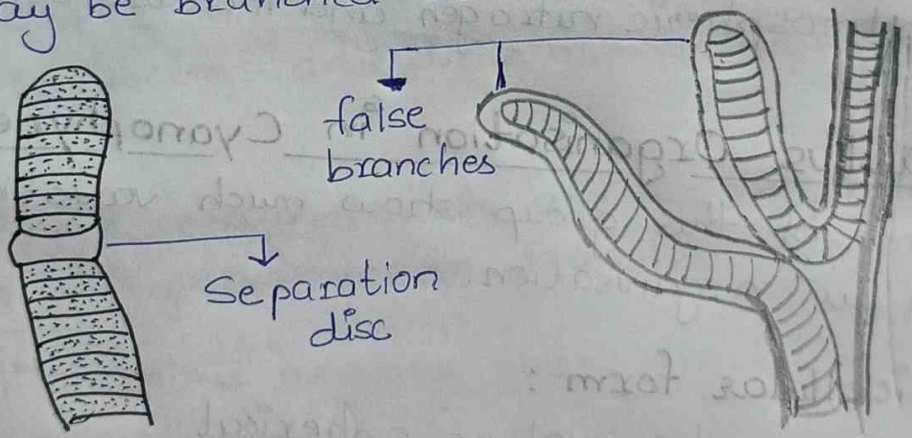
① Non-filamentous

② filamentous.

① Non-filamentous type : The cells of this type divide either alternately or in three planes, there by they form spherical, cubical, squarish or irregular colony.

② Filamentous type :

- By the repeated cell division in one plane single row of cells are formed known as trichome. eg :- Oscillatoria, Spirulina.
- The trichome when covered by mucilaginous sheath is called a filament. It may cordain single trichome or several trichome.
- May be branched or unbranched.

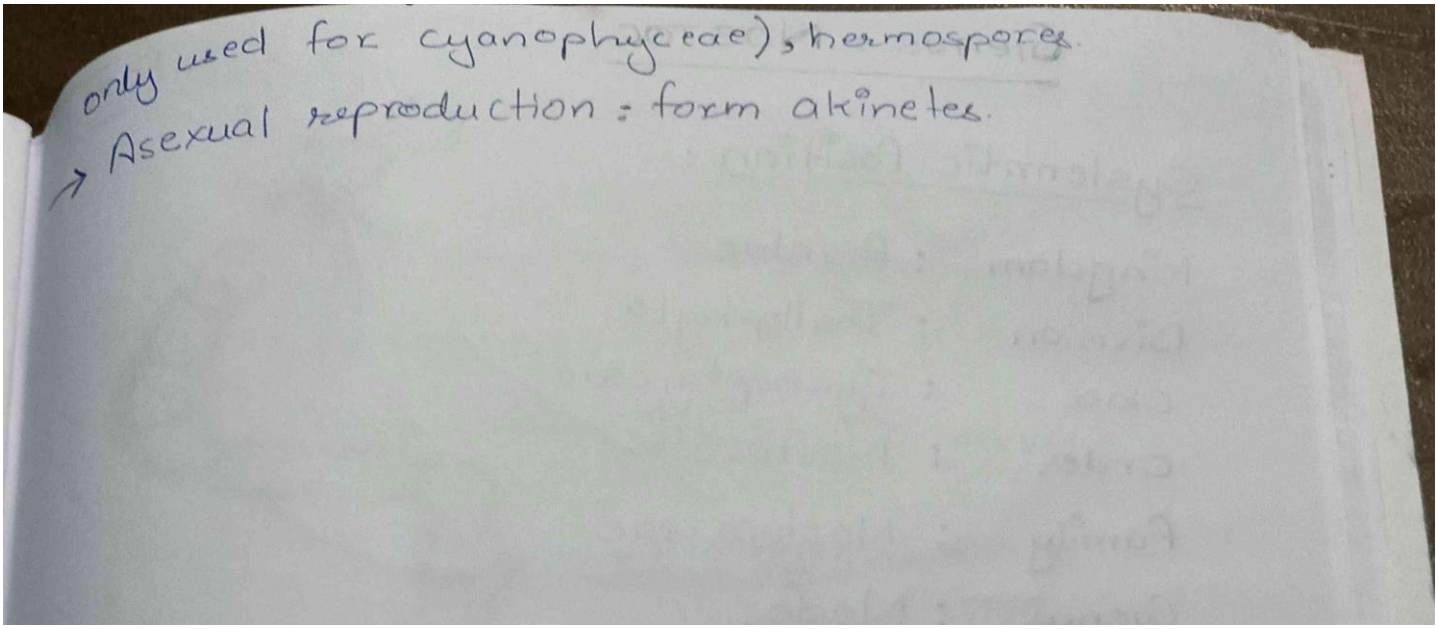


Reproduction in Cyanophyceae :

→ The B.G.A reproduce by both vegetative & asexual means.

→ Sexual reproduction is absent.

→ Vegetative reproduction performs through fission, fragmentation, hormogonia formation (term


only used for cyanophyceae), hormospores.
→ Asexual reproduction : form akinetes.

Genus : Nostoc

Systematic Position :

Kingdom : Plantae
Division : Thallophyta
Class : Cyanophyceae
Order : Nostocales
Family : Nostocaceae
Genus : Nostoc.

Occurrence :

→ Species of Nostoc occur in fresh water as well as in terestrial habitat.

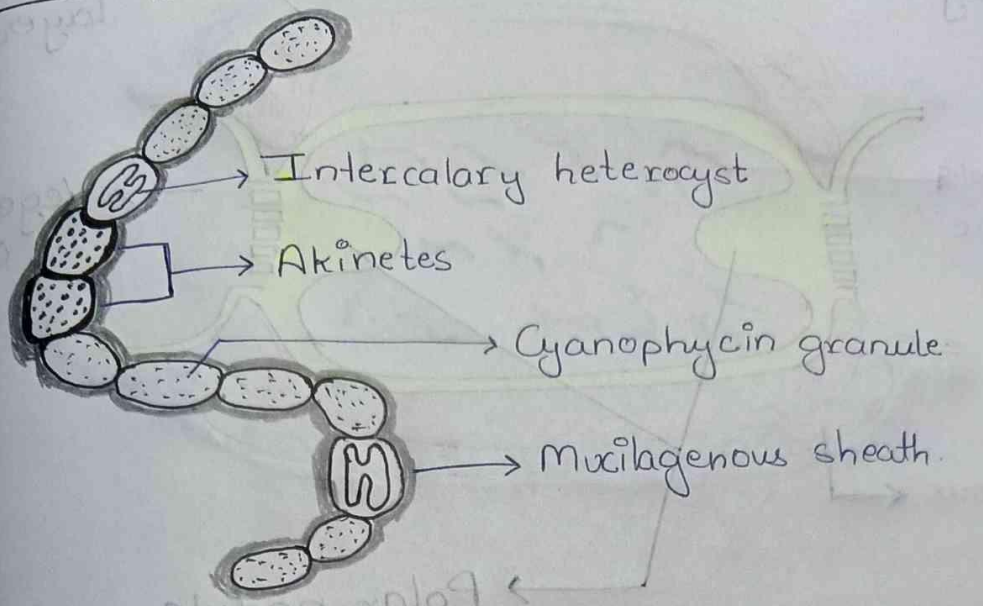
→ The fresh water species form macroscopic colonies on the surface of water.

→ Some species of Nostoc are grown in rice field.

✡ **Note:** Some species of Nostoc are endophytic & they occur in symbiotic association within other plant.

i.e : Symbiotic Association
ex - Coralloid root in Cycas [Gymno]
Thallus of Anthoceros [Bryo]

Thallus Structure



→ The trichome of Nostoc are uniseriate (in one axis or direct) usually contorted & twisted.

→ Presence of prominent constrictions between the adjacent cell.

→ Each trichome is enveloped in a gelatinous sheath which is transparent hyaline or colored.

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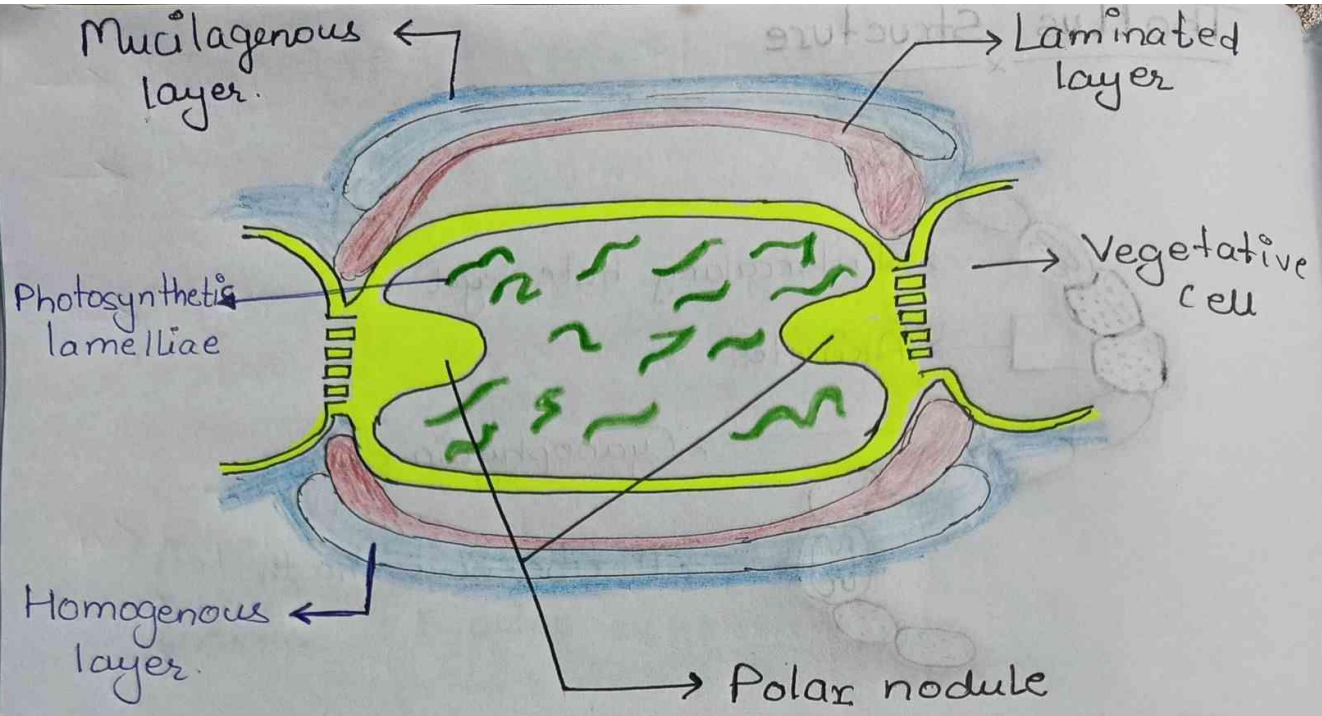
→ The cell type is prokaryotic type.

Heterocyst :

→ It is formed by modification of vegetative cells.

→ It is large sized, pale colored, thick walled cell.

→ It's position may be terminal, intercalary or lateral in filamentous cyanobacteria or cyanophyceae.



→ Thick wall is impermeable to oxygen but permeable to nitrogen.

→ Photosystem II & Photosynthesis both are absent.

→ It depends on adjacent vegetative cells for its nourishment.

→ It is specialised to perform nitrogen fixation.

→ It contains enzymes nitrogenase

Reproduction (Nostoc)

→ Nostoc reproduce only by vegetative means of reproduction.

Note: Sexual reproduction is absent.

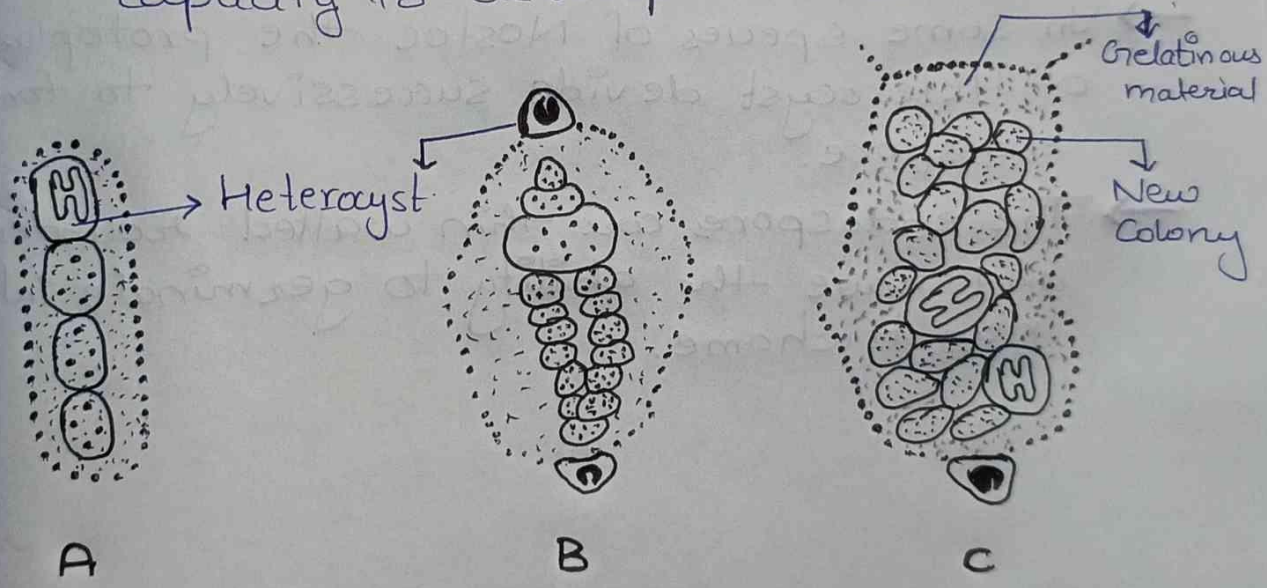
⇒ The vegetative propagation takes place by following means:

i) By Fragmentation : The colony may break into small fragments due to mechanical, physical or other factors.

→ Each fragment has the capability to develop into a new colony.

ii) By Hormogonia : The trichome breaks into small segments due to the degeneration of intercalary vegetative cells on presence of Heterocyst.

→ Multicellular fragments so formed are called hormogonia and they have the capacity to develop into new trichome.



Nostoc: Reproduction by hormogonia.

iii) Akinetes : During unfavourable conditions some cells of the trichome are transformed into resting spore or Akinetes.

→ They have an additional three layer coat outside the normal cell wall.

→ The protoplasm is full of food reserve
→ These akinetes have tremendous resistance for cold and drought.
→ During favourable condition the protoplast becomes active and breaks the thick outer covering and form new trichome.

iv) By Heterocysts
→ In some species acts as resting spores.
→ The protoplasm of the heterocyst of such species become functional and germinates to form a new trichome.

v) By Endospore :
→ In some species of Nostoc the protoplasm of Heterocyst devide successively to form endospore.
→ The endospores are thin walled rounded and have the ability to germinate into new trichome.