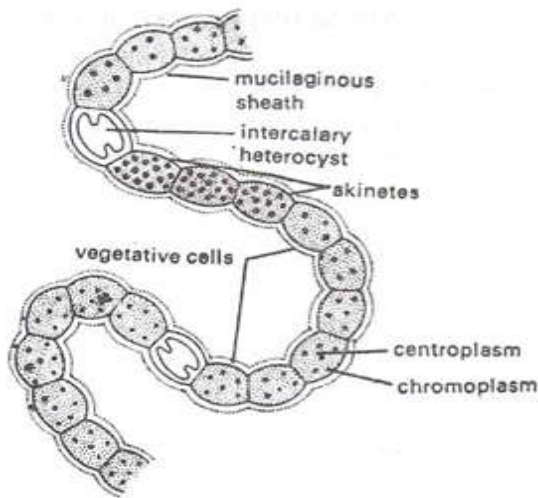


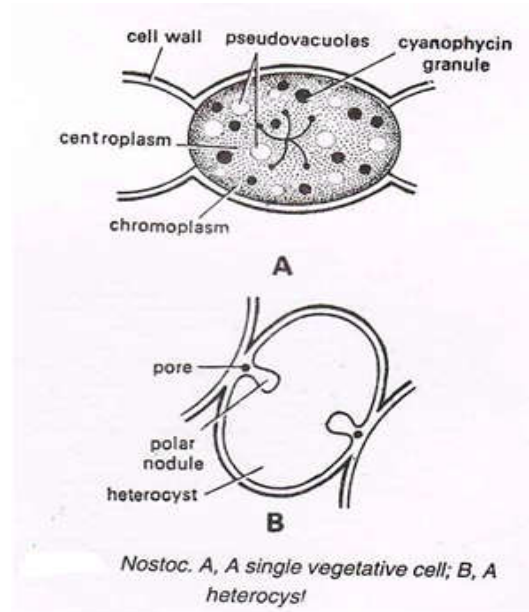
NOSTOC

1. What do you mean by Nostoc?

Nostoc is a genus of blue-green algae or cyanobacteria. They are prokaryotic and perform photosynthesis. They are found mainly in freshwater as free-living colonies or attached to rocks or at the bottom of lakes. They are also found on tree trunks. They are also found as an algal component of lichens in certain bryophytes (Anthoceros). They are capable of nitrogen-fixing and perform photosynthesis. They are also present as an endosymbiont to fungus.



Nostoc. A single filament.



Nostoc. A, A single vegetative cell; B, A heterocyst

2. Write about the Classification of Nostoc.

Nostoc are prokaryotic and are grouped with bacteria. The cell lacks membrane-bound organelles and genetic material is found dispersed in the cytoplasm. They are kept in cyanobacteria as they are photosynthetic.

Domain: Bacteria

Phylum: Cyanobacteria

Class: Cyanophyceae

Order: Nostocales

Family: Nostocaceae

Genus: Nostoc

3. Give some species name of Nostoc.

Some of the commonly found *Nostoc* species are:

Nostoc commune is eaten as a salad.

Nostoc azollae forms symbiotic association with water fern.

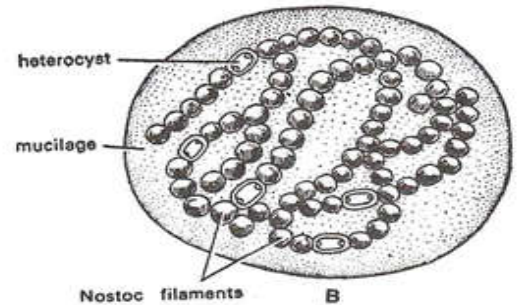
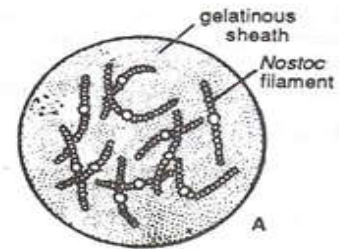
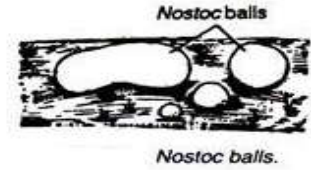
Nostoc punctiforme form symbiotic relationship with Anthceros and other higher plants.

Nostoc flagelliforme is known as Fat choy. It is used as a vegetable in China.

Nostoc pruniforme forms very big colonies (diameter as large as ~25 cm).

4. What are the General Characteristics of Nostoc?

- Nostoc is filamentous and unbranched. Numerous filaments are found in a gelatinous mass as a colony. The colonies may be as big as an egg. The filament consists of a chain of cells, which appear like a bead. They are called trichomes.



Nostoc. A, Part of a colony under low power; B, Part of a colony under high power.



COMPILED AND CIRCULATED BY BANGAMOTI HANSDA, ASSISTANT PROFESSOR,
DEPARTMENT OF BOTANY, NARAJOLE RAJ COLLEGE

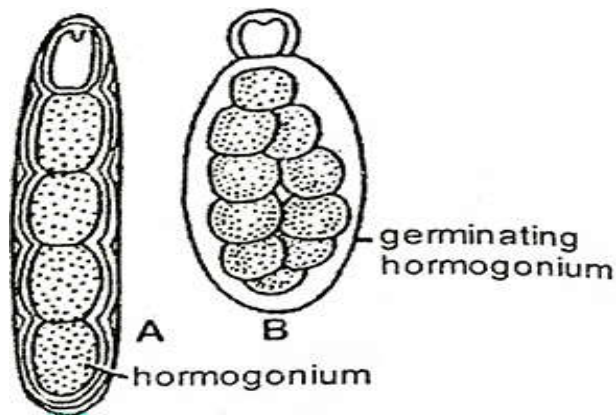
- Cells are oval, spherical or cylindrical.
- Some of the cells in the filament are differentiated, they are called **heterocyst**. They are sites for nitrogen fixation. Nitrogenase enzyme fixes nitrogen.
- Each filament is covered in a mucilaginous sheath, which is a protective layer. It absorbs and retains water. The gelatinous sheath is made up of polysaccharides and also contains proteins.
- Colonies are of different shapes, sizes and colours. They are mostly greenish or bluish-green in colour and also have red-brown or yellow-green colour.
- Extracellular pigments are also found, e.g. nostocine, scytonemin. These pigments along with some amino acids protect the cells from UV radiation.
- Each cell has a thick cell wall made up of peptidoglycan.
- The cytoplasm of a cell is differentiated into outer coloured due to peripherally arranged chromoplast and inner clear cytoplasm.
- Cells have various pigments. Cells contain chlorophyll (green pigment). Phycocyanin (blue) and phycoerythrin (red) are also present.
- Inner cytoplasm contains incipient nucleus or a nuclear body, DNA is without histones.

5. How does Nostoc reproduce vegetatively and asexually?

a. Vegetative reproduction

Nostoc reproduces vegetatively by the formation following methods: **i) Fragmentation,**
ii) Hormogones.

- i) **Fragmentation:** The trichome may break into different fragments due to physical, physiological or other factors. Each part of the trichome is capable of developing into new trichome.
- ii) **Hormogones:** Here the trichome may break into small multicellular fragments due to degeneration of intercalary vegetative cells or due to the appearance of intercalary heterocyst. These small fragments are called hormogonia or hormogones. These fragments are further developed into new trichomes by repeated cell divisions either within the mother colony or may come out and can develop a new colony and it retains the gelatinous sheath.



b. Asexual reproduction

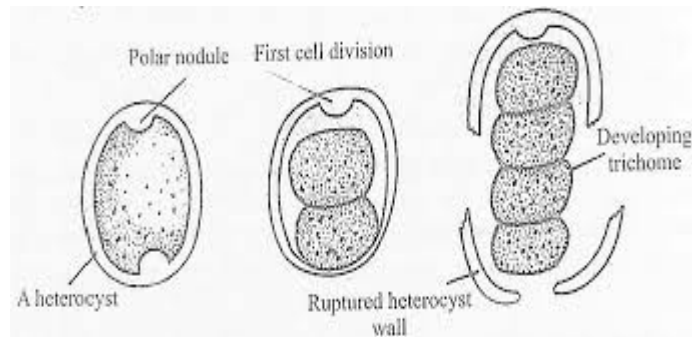
Nostoc reproduces asexually by the formation following methods: i) **Akinetes**,

ii) **Heterocyst** and iii) **Endospore**.

- i) **Akinetes:** These are unicellular, thick walled, resting spores forms in intercalary positions either singly or in chain. They are also called as arthrospores. Akinetes are large in size than the normal vegetative cells. Some of the cells become thick-walled due to accumulation of large amount of food along with Cyanophycean granules. Due to highly resistant thick wall they can

withstand unfavourable conditions for many years. Under favourable conditions, they germinate to form a new filament.

- ii) **Heterocysts:** Heterocysts behave as resting spores. On germination it develops into new trichome. During germination its protoplast divides into two cells. Both the cells divide again and form four-celled germling, which comes out by rupturing the mother wall and develop into new filament.



- iii) **Endospore:** In some species like *N. microscopicum*, and *N. commune*, the content of heterocyst divides to form many spores, the endospores. The endospore after liberation and further division develop into a new filament.

References:

1. <https://www.biologydiscussion.com/algae/morphology-of-nostoc-with-diagram-algae/54167>
2. https://www.google.com/search?q=hormogonia+of+nostoc&source=lnms&tbn=isch&sa=X&ved=2ahUKEwjdkbuK1s_uAhXyzgGHYNtCz0Q_AUoAXoECBoQAw&biw=1366&bih=657#imgrc=6nukqxGDrkLwEM&imgdii=E27xDUDyBTimgM



COMPILED AND CIRCULATED BY BANGAMOTI HANSDA, ASSISTANT PROFESSOR,
DEPARTMENT OF BOTANY, NARAJOLE RAJ COLLEGE

3. https://www.google.com/search?q=hormogonia+of+nostoc&source=lnms&tbn=sch&sa=X&ved=2ahUKEwjdkbuK1s_uAhXyzgGHYNtCz0Q_AUoAXoECBoQAw&biw=1366&bih=657#imgrc=8_mMHGM2rYuwWM&imgdii=6nukqxGDrkLwEM
4. <https://byjus.com/neet/nostoc/>
5. Hait G, Bhattacharya K, Ghosh A k. A Textbook of Botany (vol.1). New Central Book Agency (P) Ltd. 2017; ISBN:81-7381-547-x

(All the information is collected from above references and will be used only for teaching and learning purposes)