

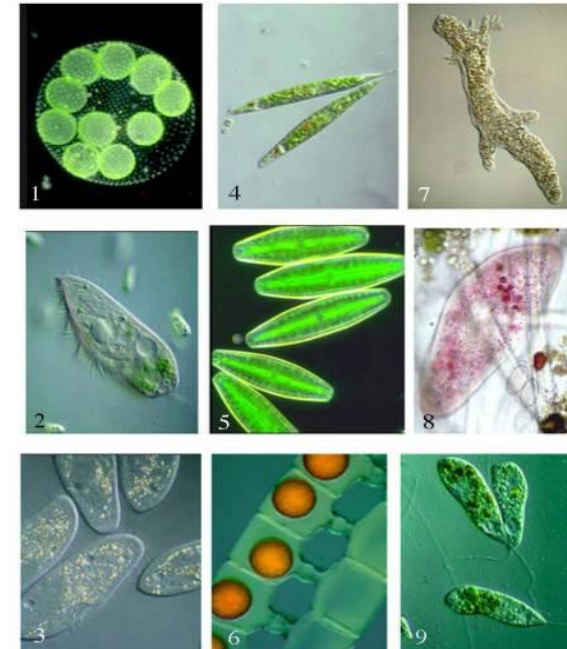
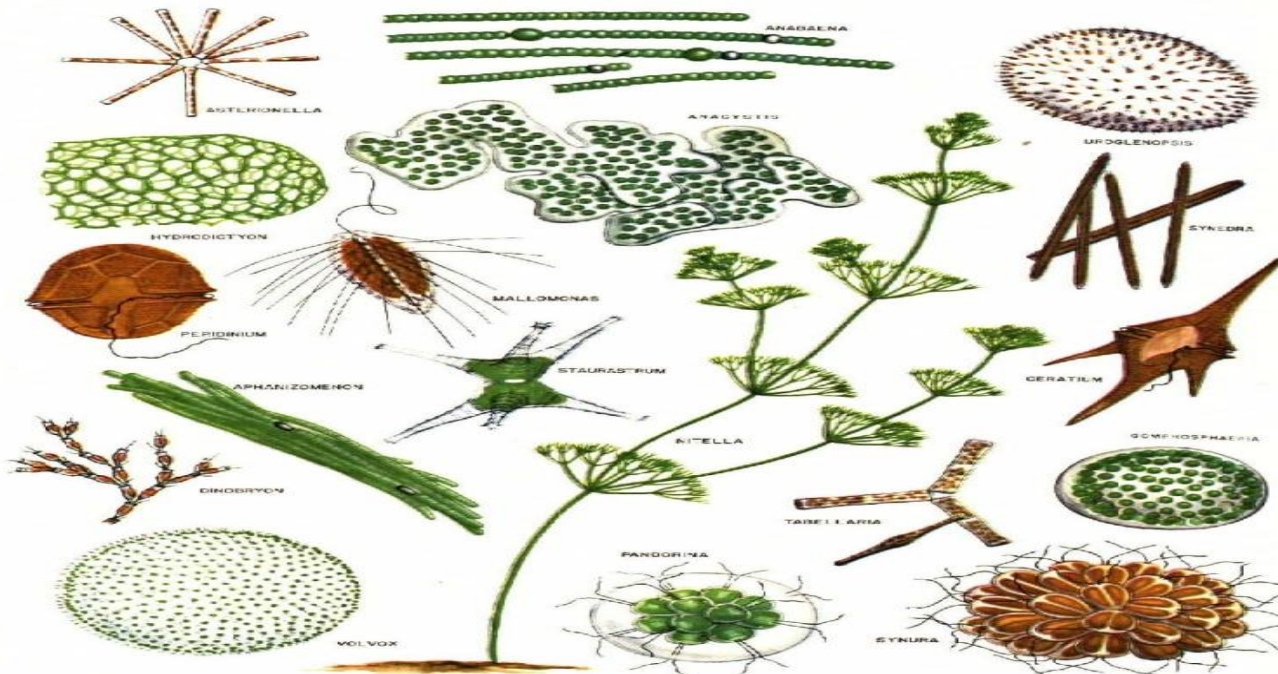
Phycology

For 2nd Year Biology & Geology

BY

DR. Abla AM. Farghl

TASTE AND ODOR ALGAE



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Photography by Bruce J. Russell

Oscillatoria sp.

❖ fresh water, filamentous, dark, blue-green alga

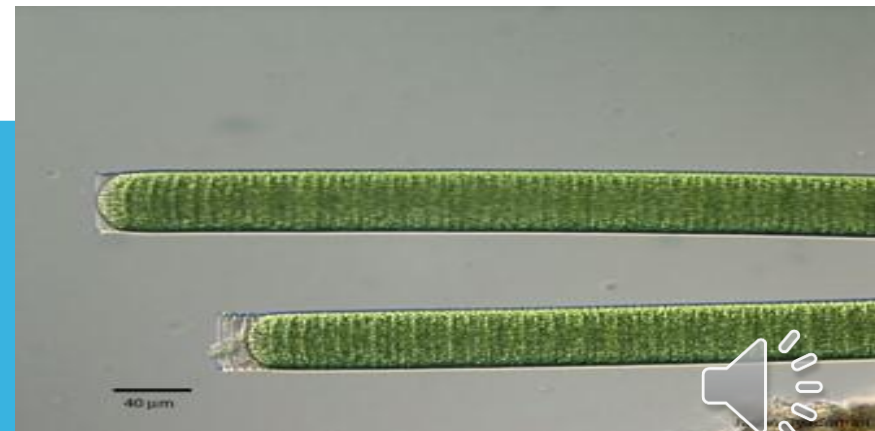
A few species are marine.

❖ **Movement:**

Under the microscope the movements are seen to be of the following types:

1. Gliding or creeping movements. Defined gliding as, "the active movement

2. *Oscillatory movements. Oscillatoria also exhibits slow waving movements.*



Taxonomic Position:

Division: Cyanophyta

Class : Cyanophyceae

Tribe : Hormogoneae

Order : Oscillatoriales

Family : Oscillatoriaceae

Genus : *Oscillatoria*



Reproduction:

Oscillatoria reproduces vegetatively.

The only known method is by the formation of **hormogones**.

-The hormogones are short sections or lengths or living cells separated from the trichomes.

The break takes place where a dead cell (**necridium**) is situated.

- The protoplast of such cells changes into a **transparent, viscous substance called the mucilage**.

The mucilage filled dead cells are called **necridia**.

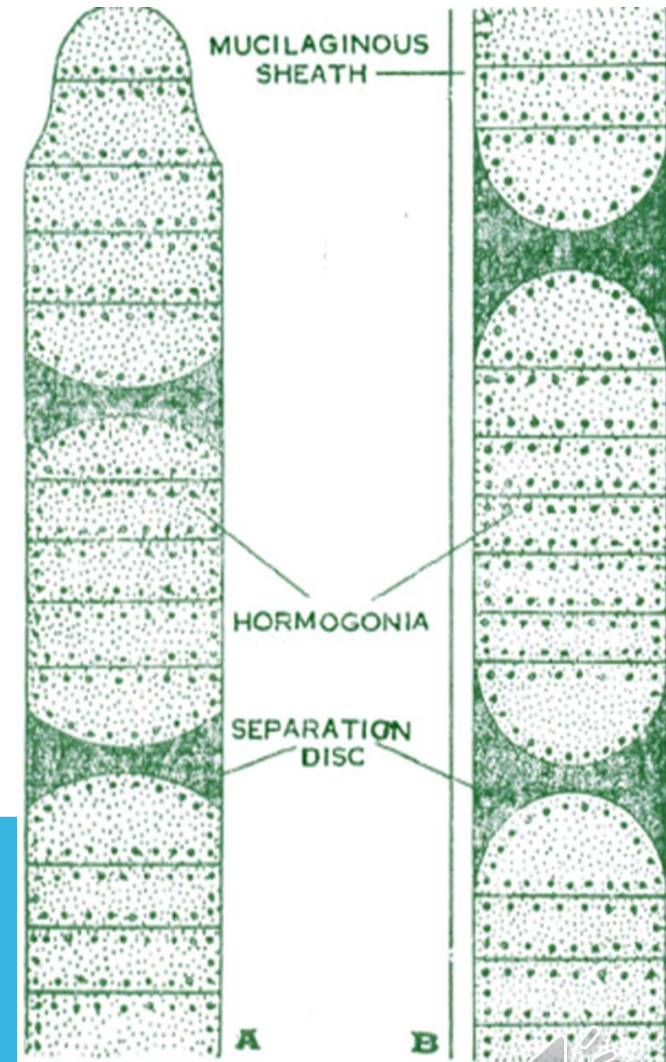
The mucilage swells and **necridia** break down releasing the **hormogones**

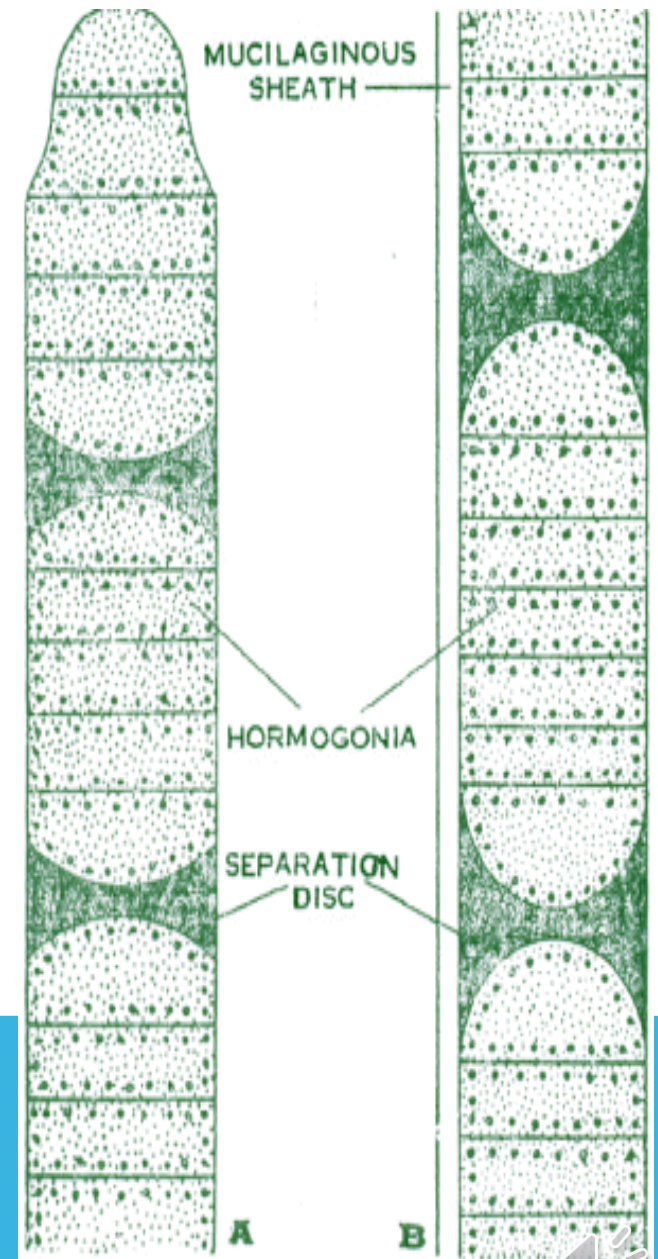
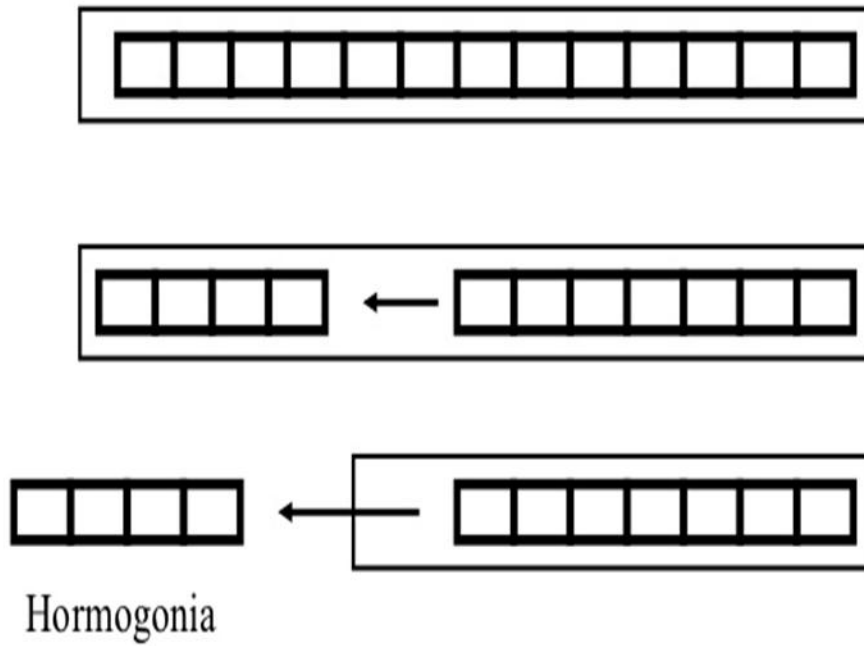


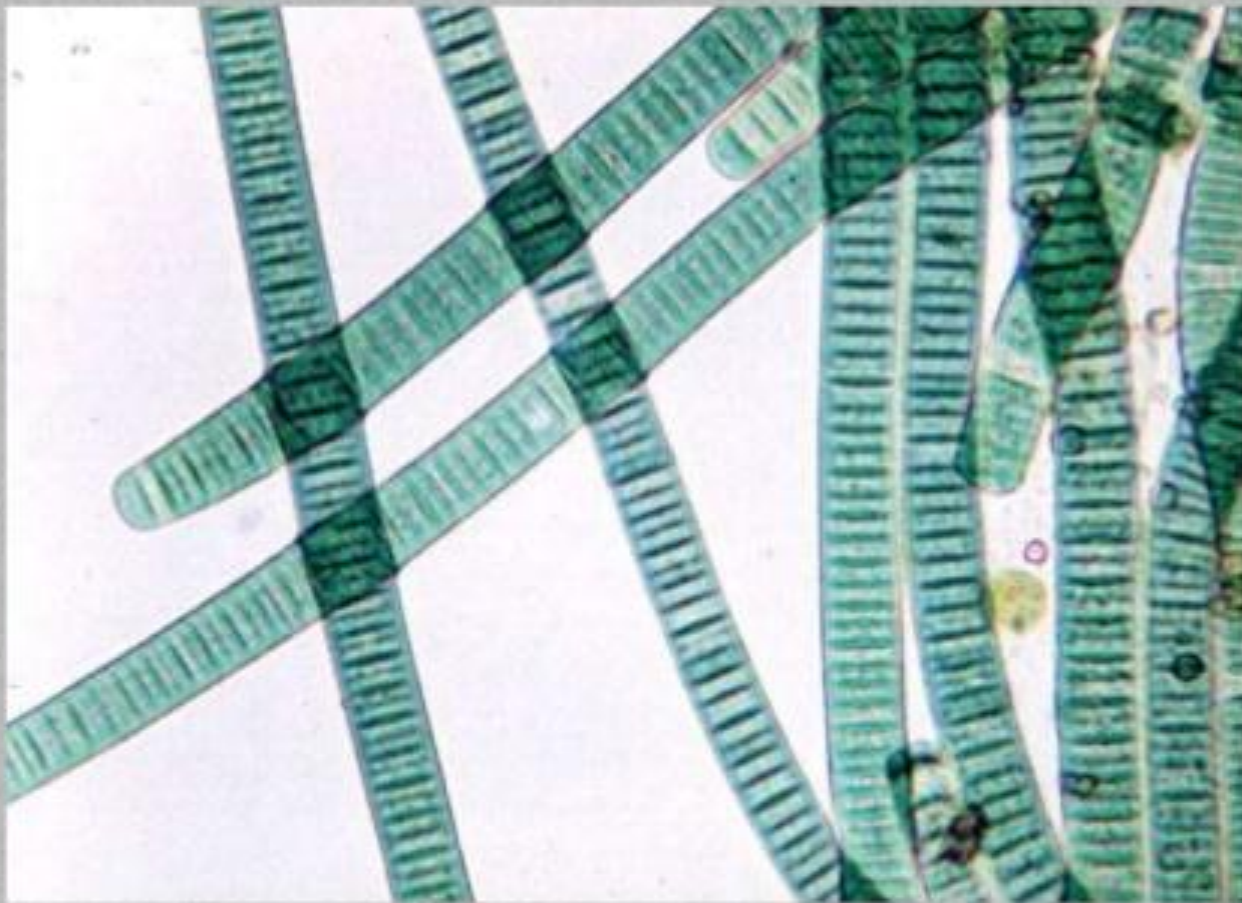
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 - The **hormogones** are short sections or lengths or living cells separated from the **trichomes**.
 - The break takes place where a dead cell (**necridium**) is situated.
 - The protoplast of such cells changes into a **transparent, viscous substance called the mucilage**.
 - ❖ The mucilage filled dead cells are called **necridia**.
- The mucilage swells and **necridia** break down releasing the **hormogones**







Oscillatoria with hormogonia

- short pieces of a trichome that become detached from the parent filament and glide away to form new filament.



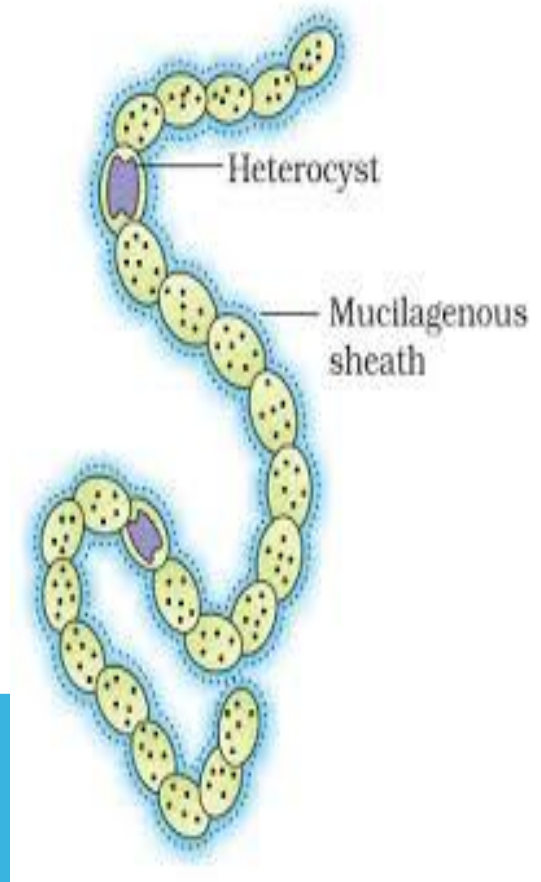


Oscillatoria (filamentous) with hormogonia

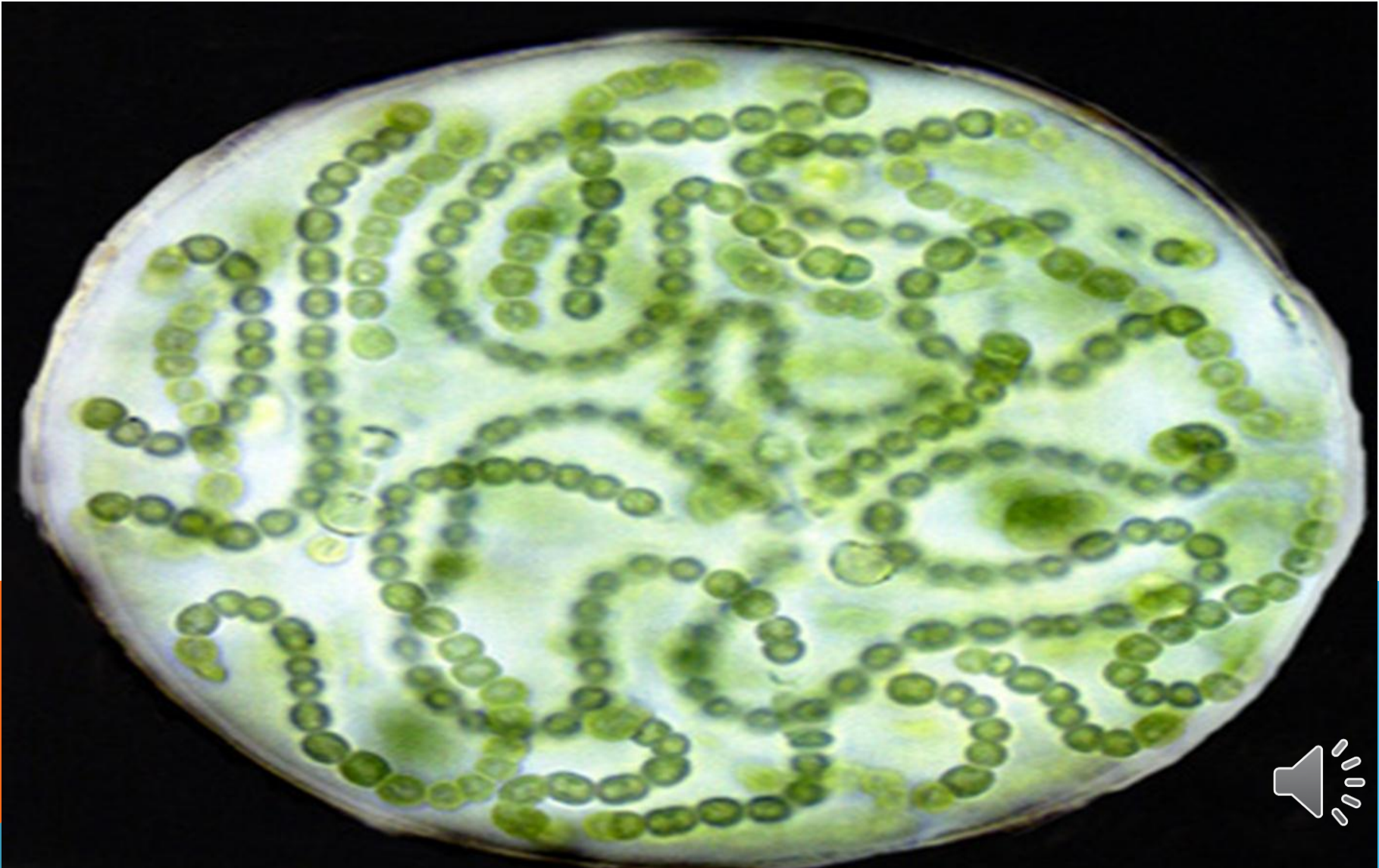


NOSTOC

- Nostoc** colony thus forms a mucilaginous lump or thallus which occurs floating or attached.
- Nostoc** occurs in symbiotic association with fungi to form lichens.
- Some species of **Nostoc** have been reported to fix atmospheric nitrogen and tend to maintain fertility of paddy fields.



Nostoc sp



Reproduction

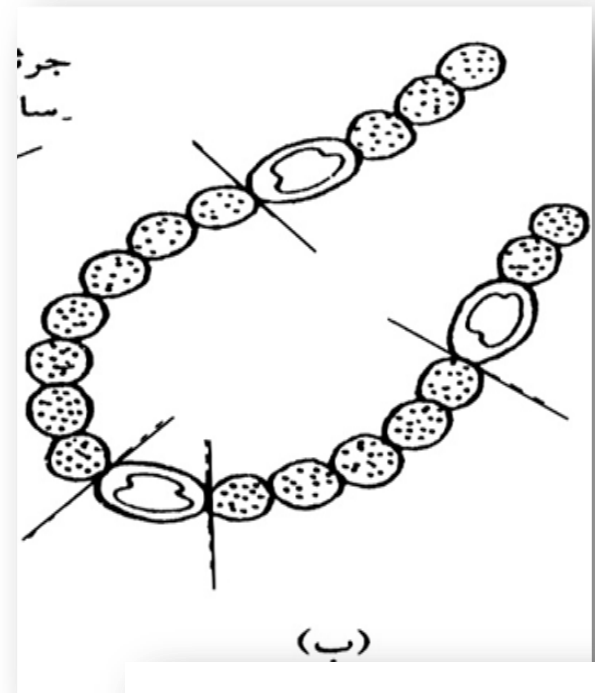
Nostoc reproduces entirely vegetatively by the following methods:-

1. Colony Fragmentation.

2. Hormogonia

Hormogone formation is very common in **Nostoc**. The trichome ruptures at places where a heterocyst and the vegetative cell adjoin.

3. Resting spores or akinetes



walls.

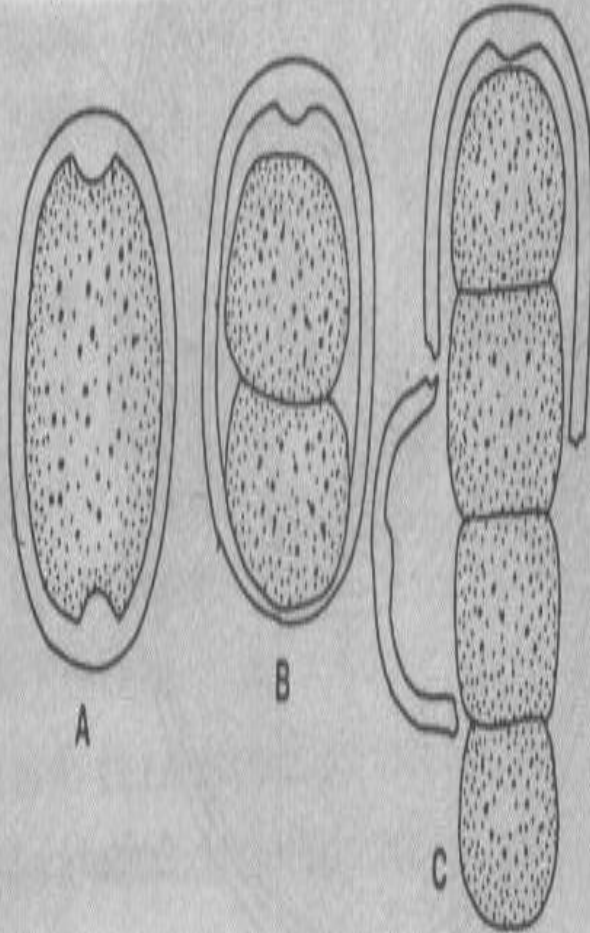


Fig. 2.26 (A-C) *Nostoc*. Stages in germination of heterocyst (After Geit)

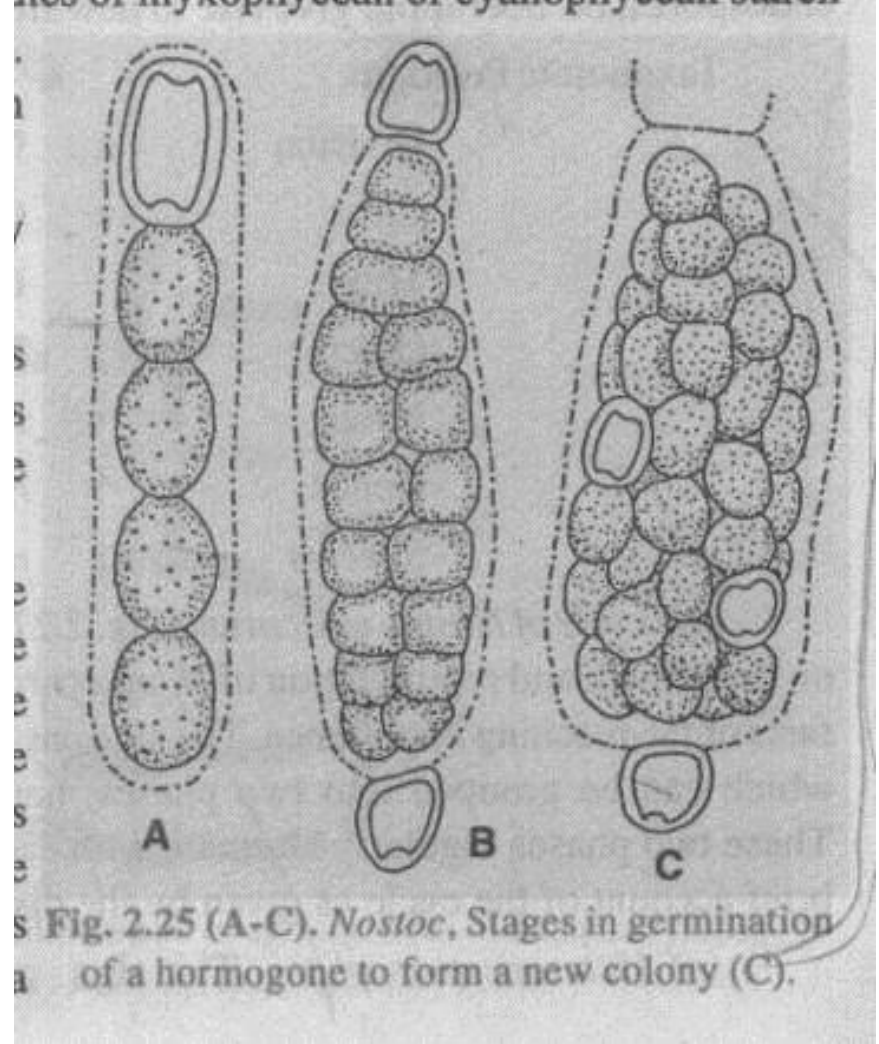
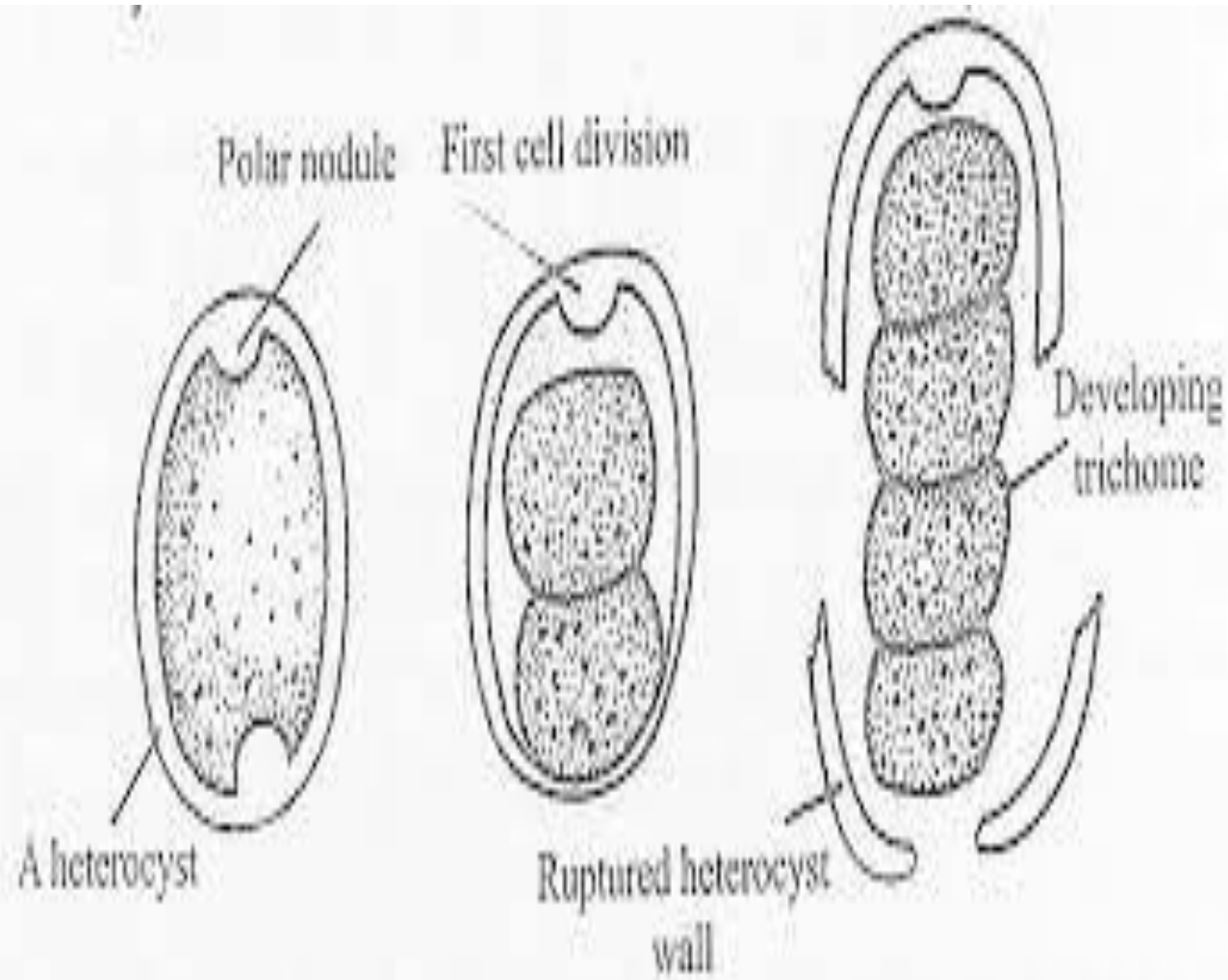


Fig. 2.25 (A-C). *Nostoc*. Stages in germination of a hormogone to form a new colony (C).

Heterocyst germination of Nostoc





Taxonomic Position:

Division: Cyanophyta

Class : Cyanophyceae

Tribe : Hormogoneae

Order : Nostocales

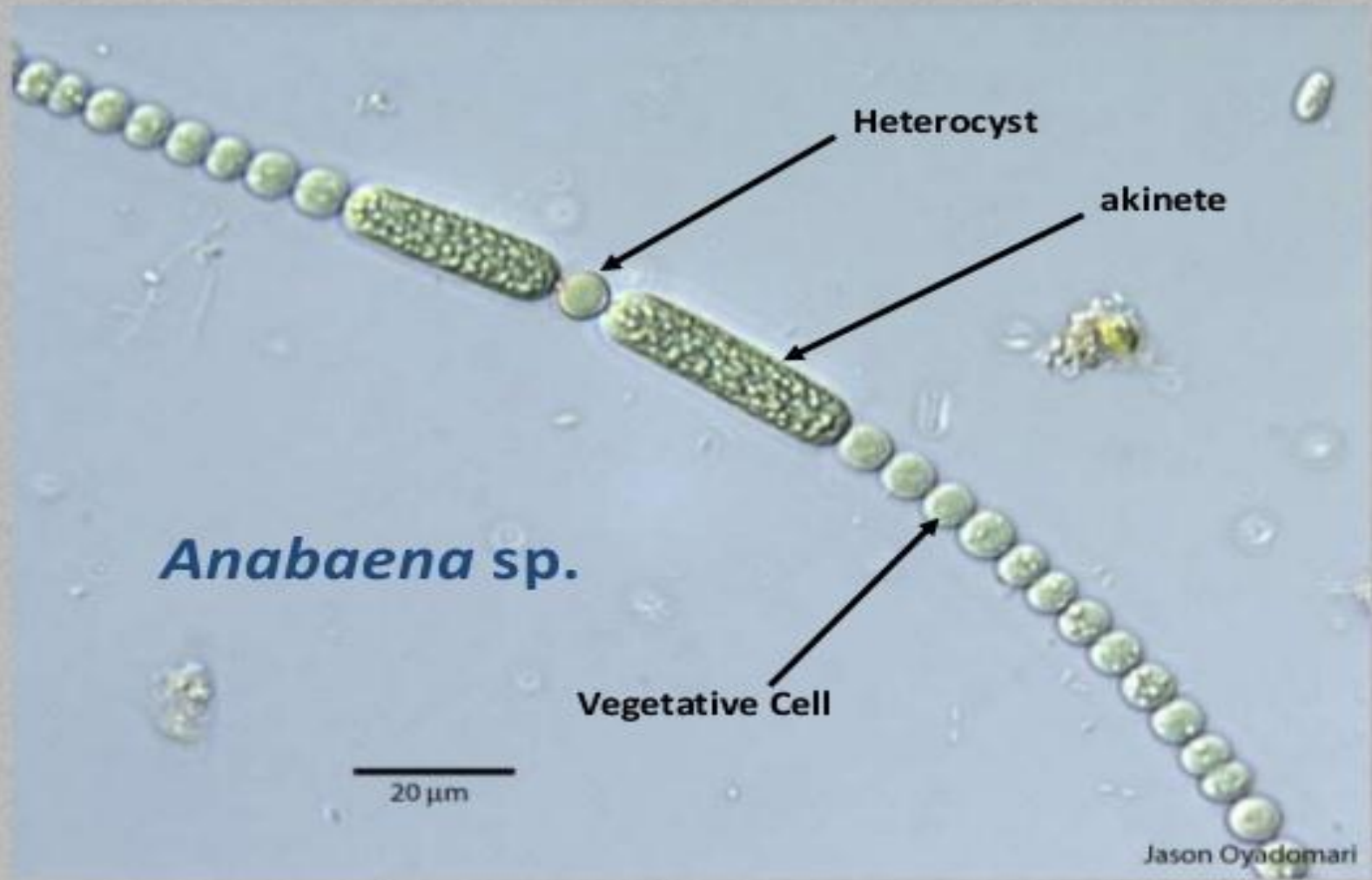
Family : Nostocaceae

Genus : Nostoc

Species : muscorum



Cyanobacteria /Cyanophyceae: Nostocales



Classification

Domain – Bacteria

Phylum – Cyanobacteria

Class - Cyanophyceae

Order – Nostocales

Family – Nostocaceae

Genus - Anabaena



Introduction

- ❖ Anabaena is a genus of filamentous cyanobacteria, or blue-green algae.
- ❖ It found as plankton. It is known for its nitrogen fixing abilities.
- ❖ They form symbiotic relationship with certain plants, such as the mosquito ferns.
- ❖ Some species of anabaena are endophytes. They live in the roots of Cycas and Azolla.



Heterocyst

- A heterocyst is a differentiated cyanobacterial cell that carries out nitrogen fixation.
- The heterocyst function as the site for nitrogen fixation under aerobic conditions.
- They are formed in response to a lack of fixed nitrogen (NH_4 or NO_3).
- They contain only photosystem 1, which enables them to carry out cyclic photophosphorylation and ATP regeneration



Akinetes

- An akinete is a thick walled dormant cell derived from enlargement of a vegetative cell.
- It serves as a survival structure. It is a resting cell of cyanobacteria.
- Akinetes appear thick walled with granular looking cytoplasm, under magnification.
- The akinetes are filled with food reserves, and have a normal cell wall surrounded with 3 layer coat.



Reproduction

- Anabaena is reproduced only by vegetative and asexual methods.
- The sexual reproduction is completely absent.

Anabaena reproduce vegetatively by the following methods-

- ❖ Fragmentation

- Old trichome becomes very large and irregular due to which it gets to break up into short fragments.



- These short fragments of trichome divide vegetative cells and develop into new trichome.
- ❖ Hormogones
- Hormogones are the short fragments of trichomes. Developed in the region of heterocyst.
- Then they came out of th trichome due to some movement.



- They divide vegetative cells and developed heterocyst and again surrounded by sheath. In this way new trichome is formed.



Anabaena reproduce asexually by following methods

❖ Akinetes

- The akinetes are produced in mature colonies. They are formed in unfavorable conditions.
- They are also called arthrospore or resting spore. They are penetrating bodies.
- In favorable conditions they directly or indirectly giving rise to new filaments.
- The contents of akinete divide into bits prior to germination.



❖ Heterocyst

- Heterocyst cell divide transversely and form (2-4) celled hormogones.
- These hormogones come out by bursting the thick wall of heterocyst and germination occurs to give rise to new trichome.





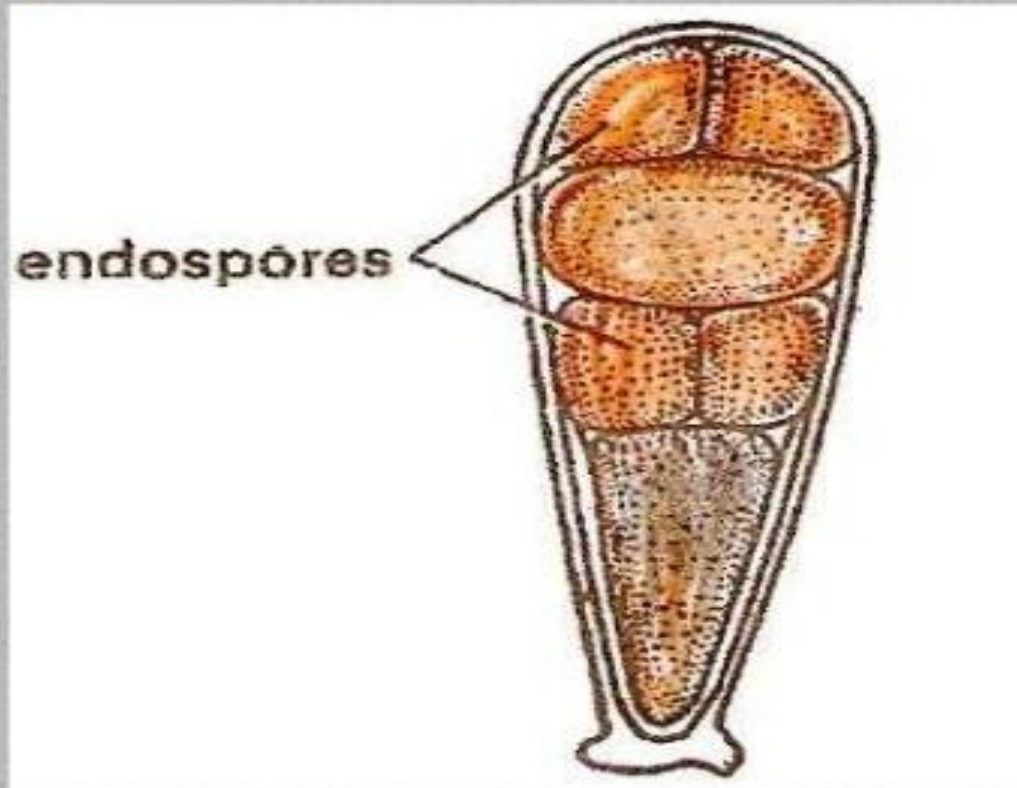
Spirulina

- Filamentous
- Common in lakes with high pH
- Major food for flamingo populations
- Commercial food source



Asexual Reproduction

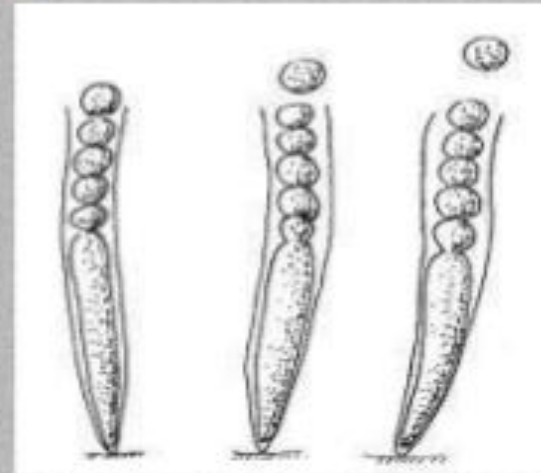
- Endospore



Dermocarpa clavata



Asexual Reproduction



Chamaesiphon clavata



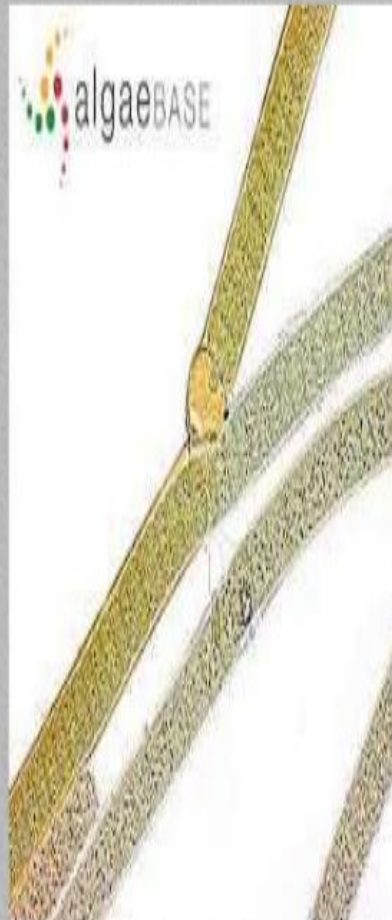
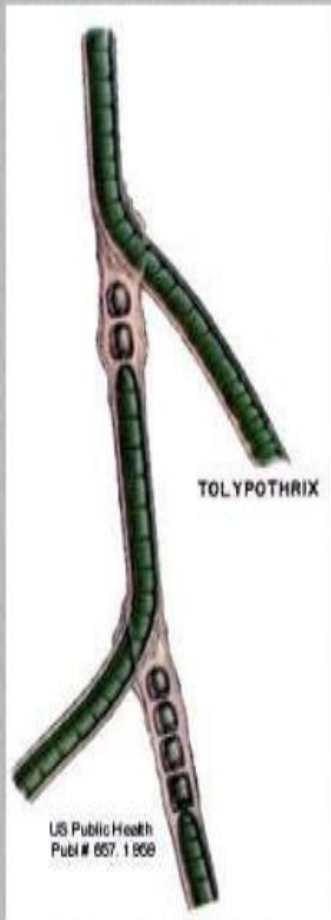
BRANCHING IN CYANOBACTERIA

False branching =
outgrowth of filaments
adjacent to dead or
specialized cells; filament
curves



True branching =
outgrowth from cells that
change their axis of
division, 90 degrees from
axis of trichome

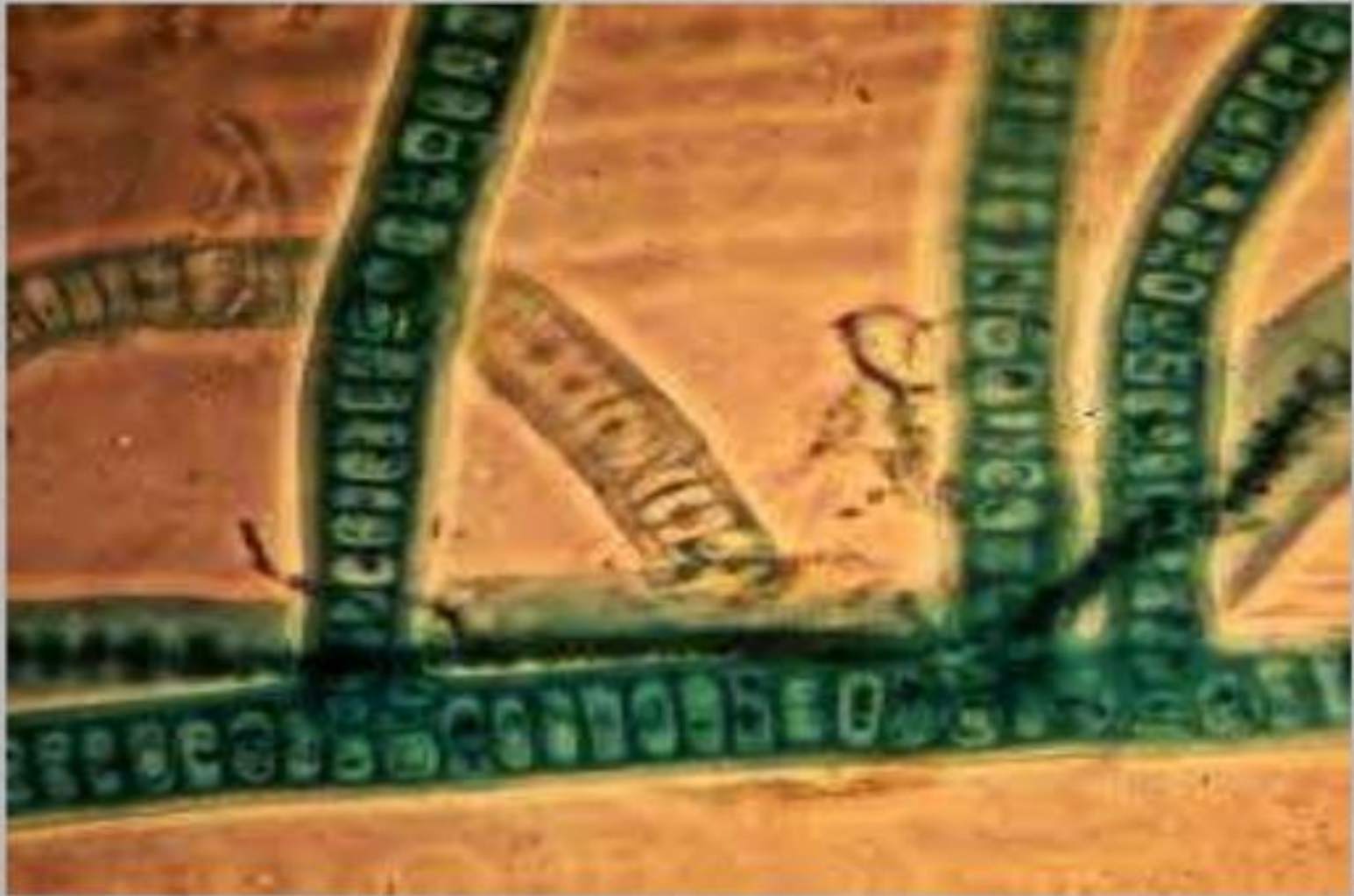




Tolypothrix (False Branching)

Scytonema (False Branching)





Mastigocladus (Fischerella)

True Branching





Vegetative cell

Slime sheath

Heterocyst

Decaying cell

Scytonema sp.

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Thank
you!!