Biology Dept., College of Education,
Salahaddin University - Erbil,
Kurdistan region - Iraq

Division: Cyanophyta

Cyanobacteria, Blue-Green Algae

Lab-3

Practical Phycology

Division:	**Cyanobacteria**
Class:	**Cyanophyceae**
2. Order:	**Nostocales**
1- Family	**Nostocaceae**
Genus	***Nostoc* sp.** ***Anabaena* sp**
2-Family	**Scytonemataceae**
Genera:	***Scytonema* sp.** ***Tolypothrix* sp.**
3-Family:	**Rivulariaceae**
Genus:	***Rivularia***
4-Family	***Gloeoitrichiaceae***
Genus	***Gloeoitrichia***

Division: Cyanophyta
Class: Cyanophyceae (Myxophyceae)

2- Order: Nostocales

Family: Nostocaceae

1- Genus: *Nostoc* sp.
2- Genus: *Anabaena* sp.

2- Order: Nostocales

I. Plant body is **filamentous**.

II. Reproduced by **horomogonia** formation.

III. Akinites and **heterocysts** are present.

IV. It fixes atmospheric nitrogen and thus increases the soil fertility.

Family: Nostocaceae

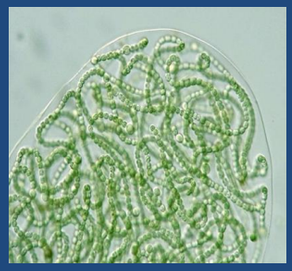
Genus: *Nostoc* sp.

Common occurrence :

1. **Found in fresh water and ponds, pools and water way** in the form of little balls of jelly.
2. Present on **moist soil**, **moist rocks** and **trees** in **the form of mucilaginous masses**.
3. Are **endophytic** (roots of ***Zamia***).
4. Connect themselves with fungi to form lichens.

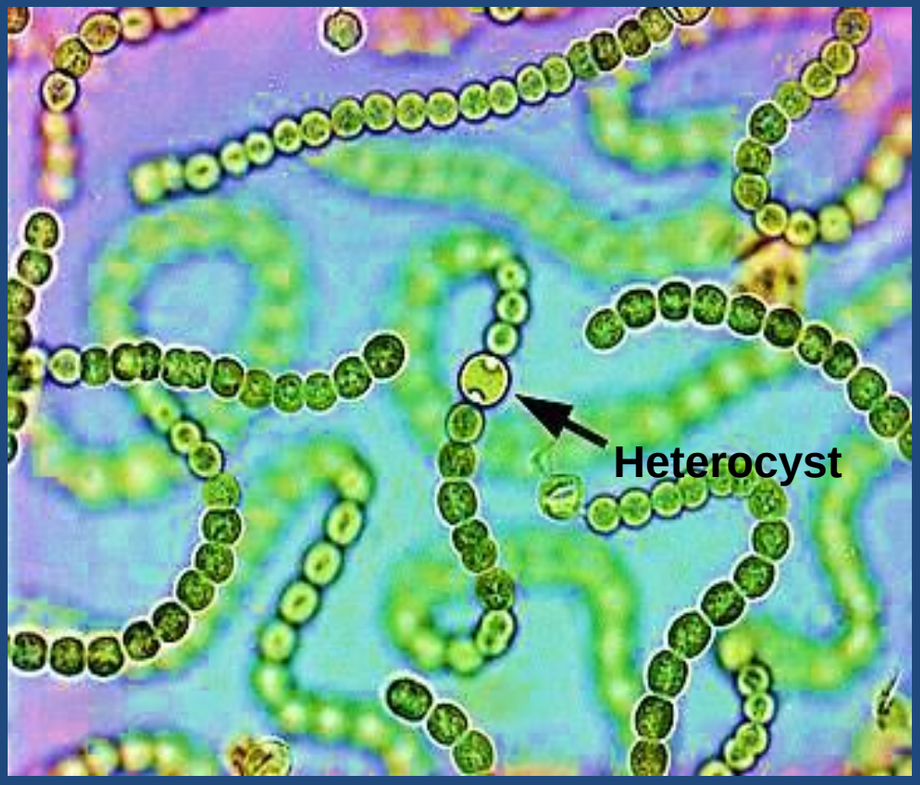
External features

1. ***Nostoc*** is a **filamentous algae**, are present in the form of colony.

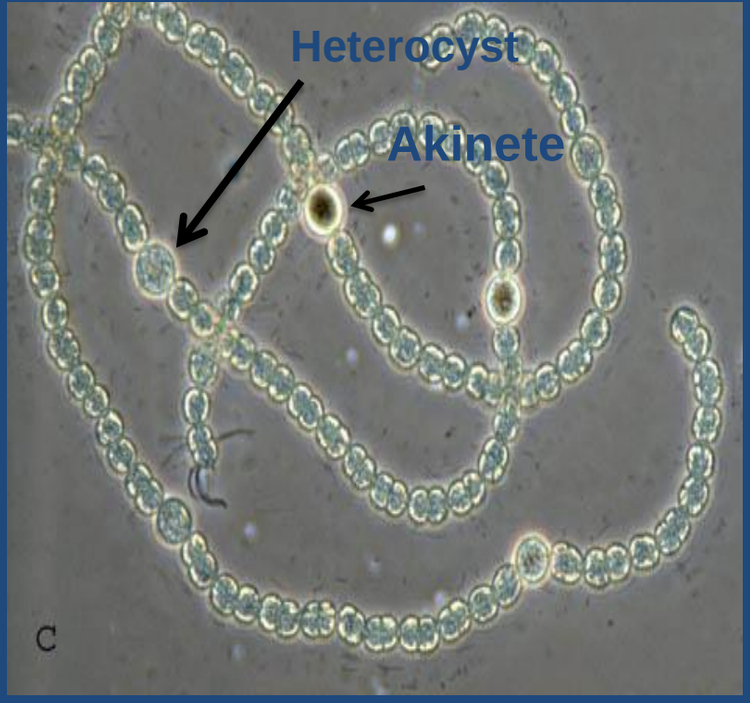


2. Cell wall is composed of **cellulose**.
3. Beaded like colony which are **greenish to blue-green** in colour is enveloped by a **gelatinous sheath.**
4. Each colony contains thousands of straight **filaments** and **trichomes**. Each trichome consists of **vegetative cells**, akinete and **heterocyst** arranged in a beaded
5. Each cell is fairly **cylindrical** or **spherical** in shape.
6. In filaments, there are found some large, spherical or cylindrical, colourless empty cells called **heterocysts.** Each **heterocyst** contains two polar nodule.

Nostoc Sp.



colony of *Nostoc Sp.*



Genus: *Anabaena* sp.

Common occurrence:-

1. It is found in **fresh water** or **permanent pools**.
2. Some species are **endophytic algae** found as **lichenes**.
3. Few are found in the **leaves** of *Azolla* e.g.

   A. Azollae.

External features:

I. The genus ***Anabaena*** is very **similar** to and a close relative of ***Nostoc***. It differs from ***Nostoc*** in **not having a firm colony or ball like structure.**

II. Vegetative cell, **Akinete**, **Heterocyst** are found.

II. **Trichomes** generally occur solitary or in small groups.

III. **Trichomes** are uniformly broad throughout their length and lacking of mucilaginous sheath.

V. Each cell of the trichome is **spherical, barrel shaped** or **sub-cylindricnl in shape**.

VII. Cells may or may not contain the pseudovacuoles.

X. Each **heterocyst** contains two polar nodules through which it remains connected with the adjacent vegetative cells.

Reproductive features:

It is reproduces by

1- **Hormogonia**

In case of hormogonia formation, the filament breaks up into number of short segments from the point of heterocysts. These segments are known as hormogonia and they give rise to new filaments.

2- **Akinites.**

Under unfavorable conditions, big cells with full of reserve food material are formed in the filament which are known as **akinites, In favorable conditions** each akinite germinates to form a new filament.

3 In exceptional case, **heterocyst** may germinate to form a new filament as for e.g. *Nostoc commune.*

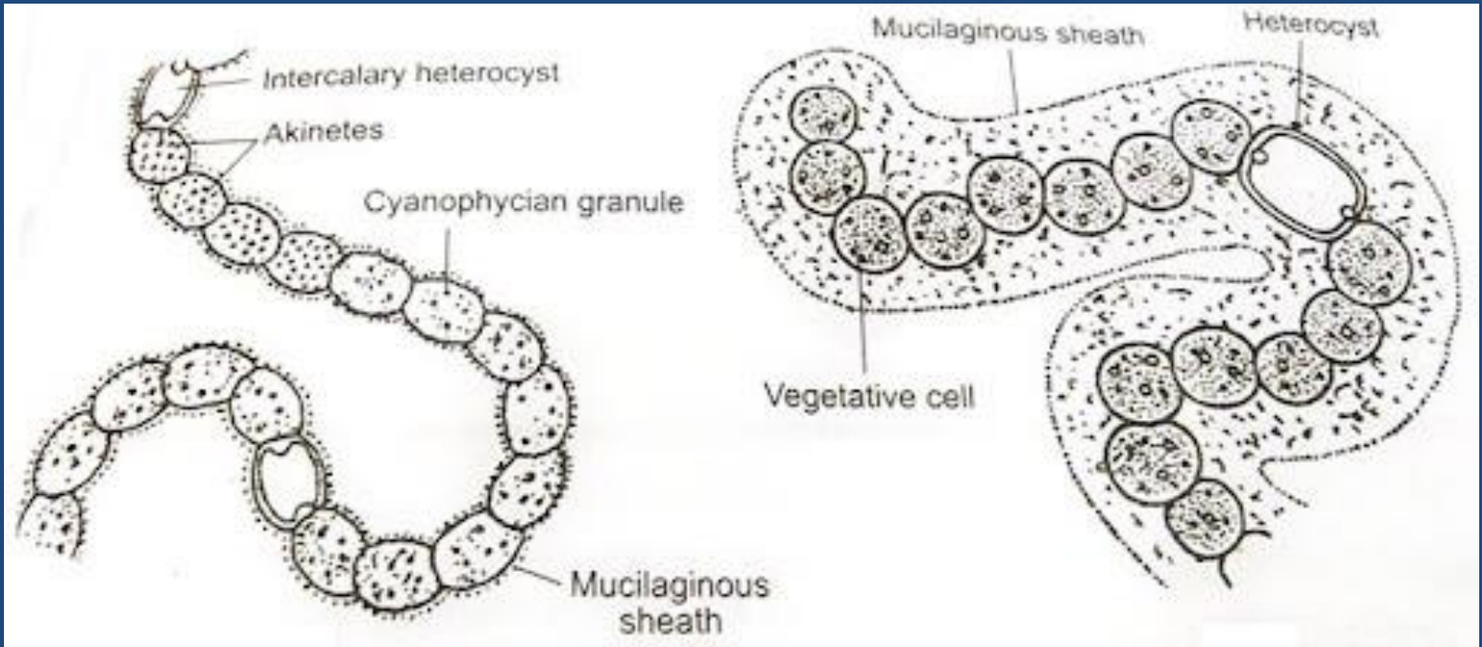


Diagram of Nostoc

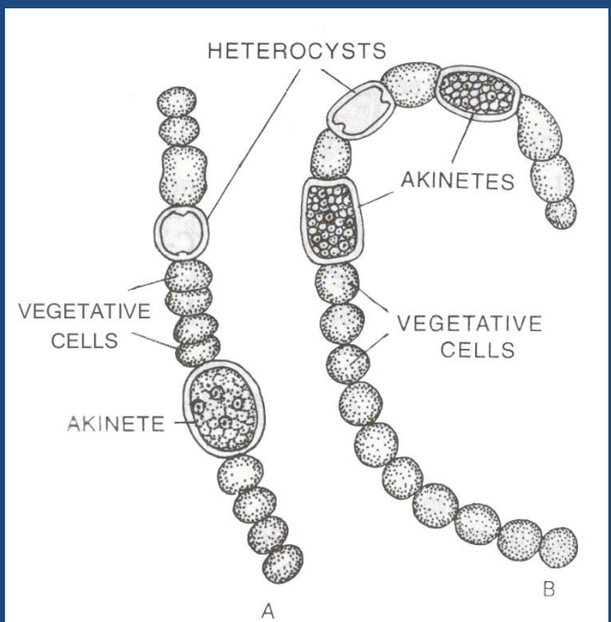
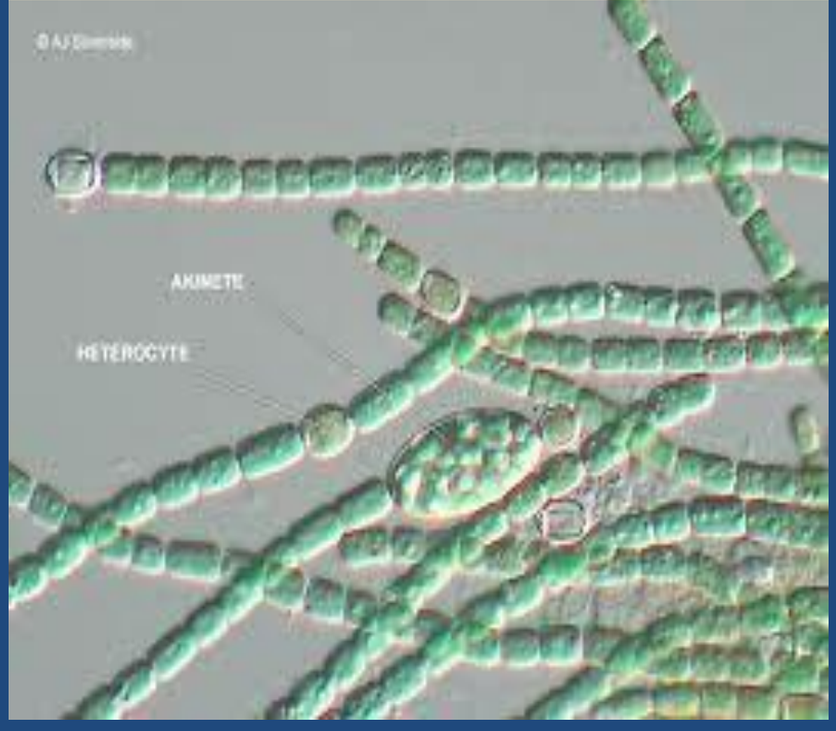


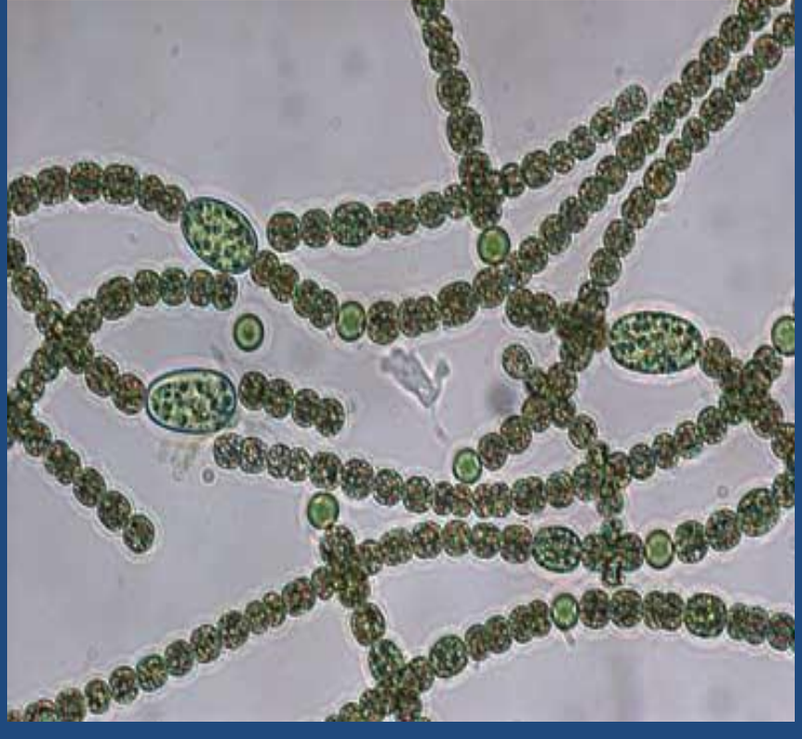
Fig: A part of filament bearing Heterocysts and Akinetes.

Diagram of Anabina

Anabaena Sp.


US Public Health Publ #657. 1959.
ANABAENA


AKINETE
HETEROCYTE



Scytonema sp.

1. The branches arise either between two **heterocysts** or else adjoining one as a result of the degeneration of an intercalary cell.
2. The sheaths which surround the trichomes are always **firm**, **wider**, **hyaline** or **coloured.**
3. The heterocysts (Intercalary) are the same size as vegetative cells.
4. **Akinetes** are rare.

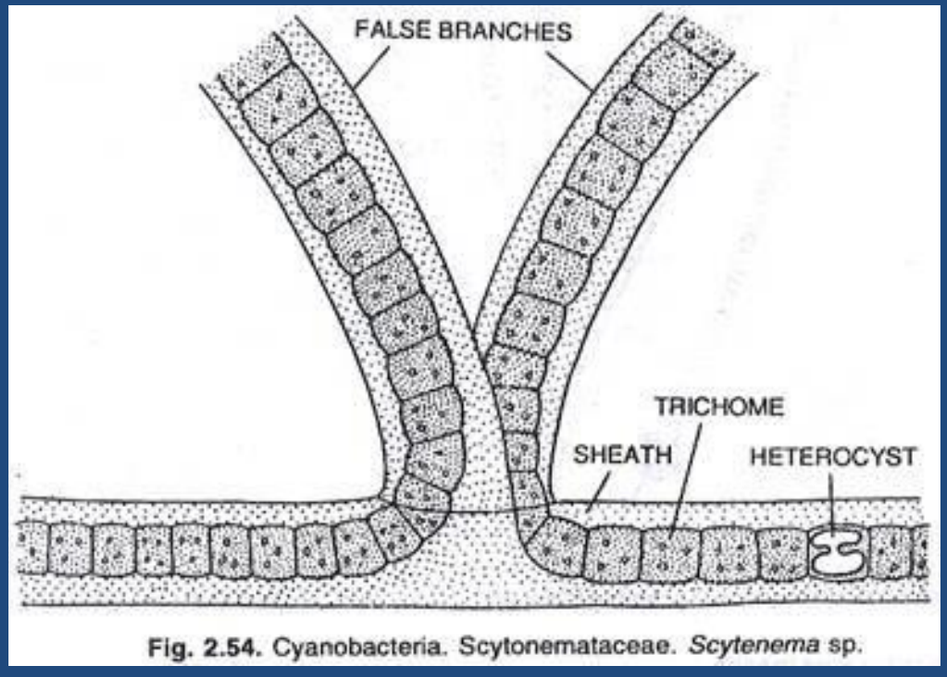
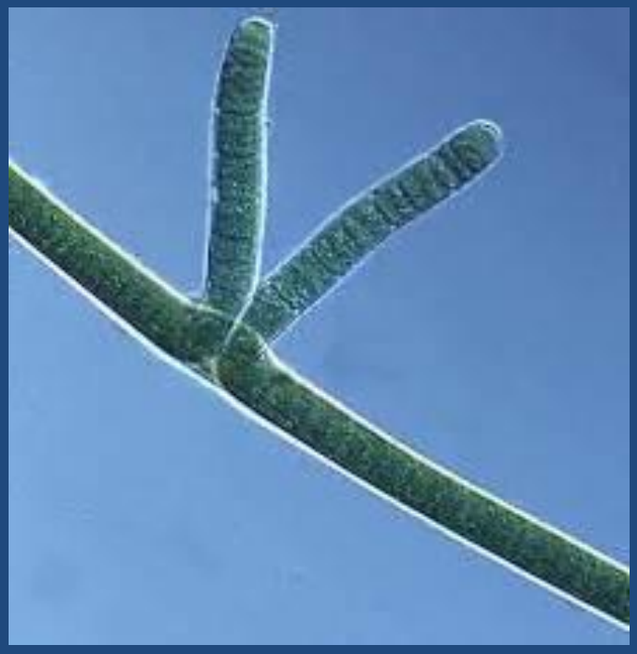


Fig. 2.54. Cyanobacteria. Scytonemataceae. *Scytenema* sp.

Tolypothrix sp.

1. The false branches of this genus arise **singly** and immediately adjacent to heterocysts.
2. The general appearance of the filament is quite like that of ***Scytonema*** but the sheaths are **narrower** in ***Tolypothrix*.**



***Scytonema* sp.**

***Tolypothrix* sp.**

Rivularia sp.

1. Is found growing on submerged **stones**, **moist rocks** and **on damp soils** near the riverside.

2. Is found in colonies and the **trichomes** are radially arranged within a colony, with each trichome wholly or partially surrounded by a **gelatinous sheet**.

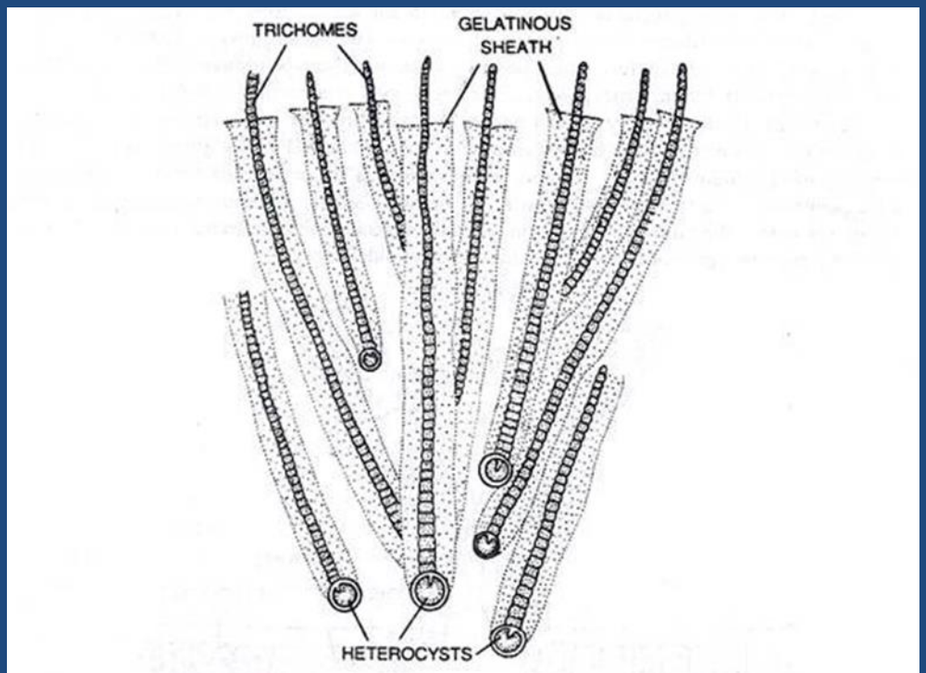


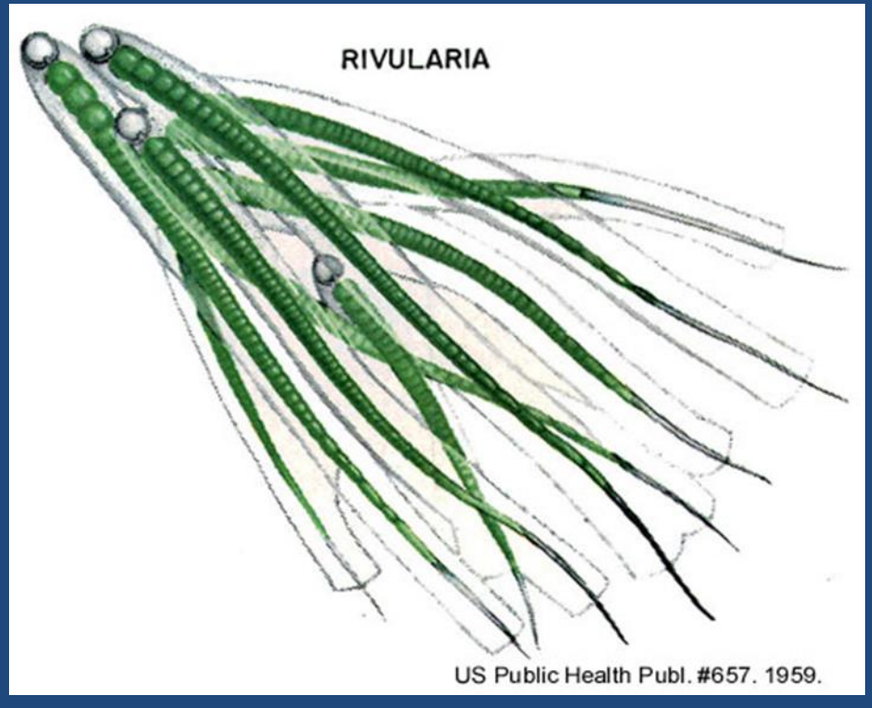
Fig. 2.52. Cyanobacteria. *Rivularia*. Trichome attenuated from base to apex and possess basal heterocysts.

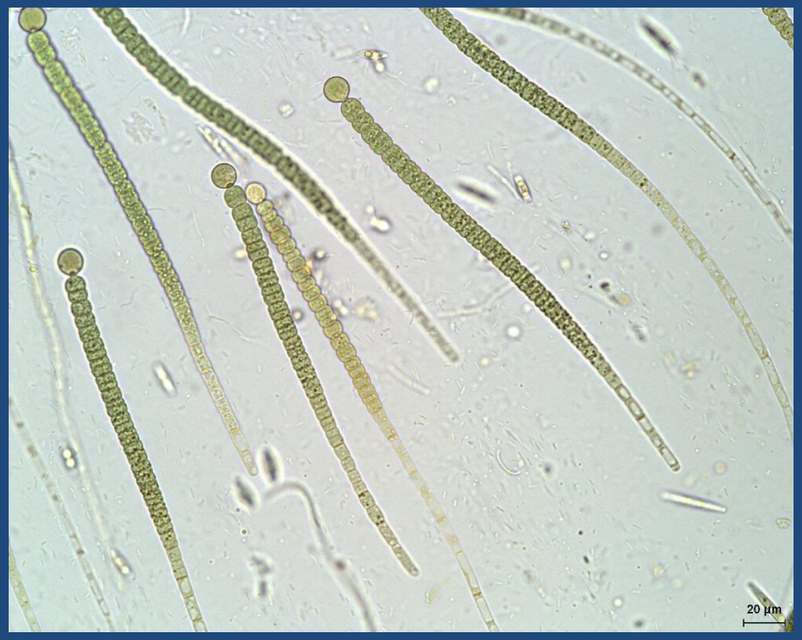
3. The trichomes have a basal **heterocyst**.

4. Each trichome has a narrow optical portion which is whip or tail like consisting of a row of small cells.

5. **Akinetes** are absent in *Rivularia*.

8. **Reproduction by hormogonia and heterocyst.**





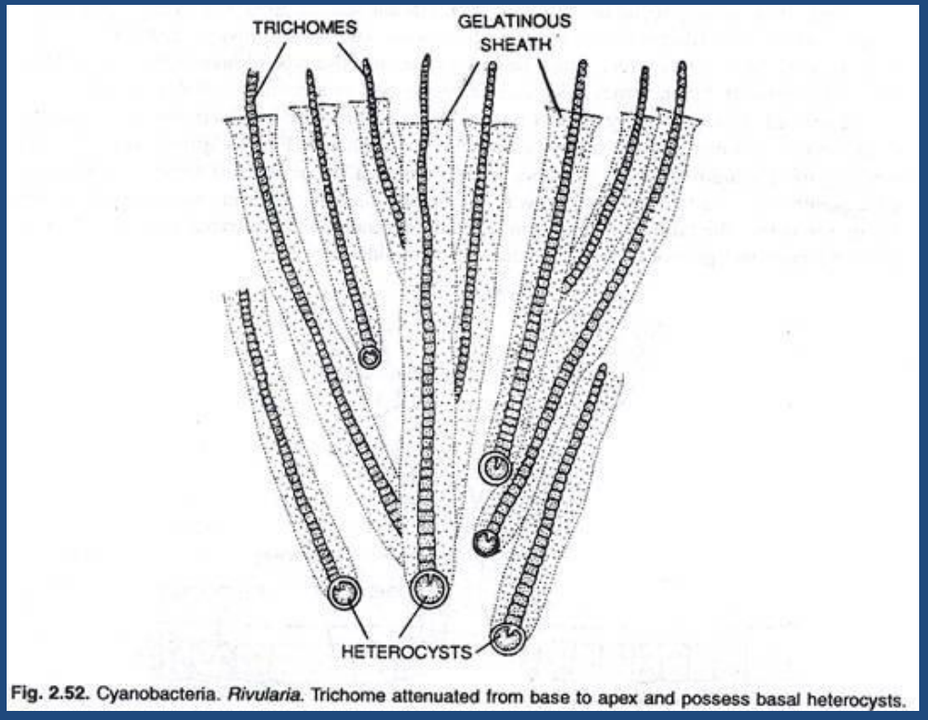
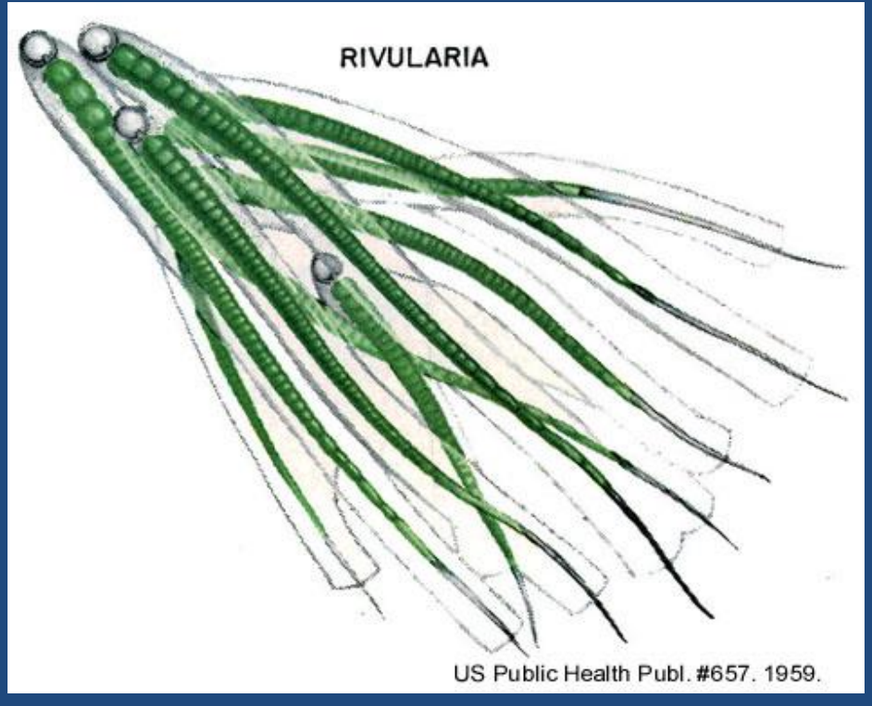
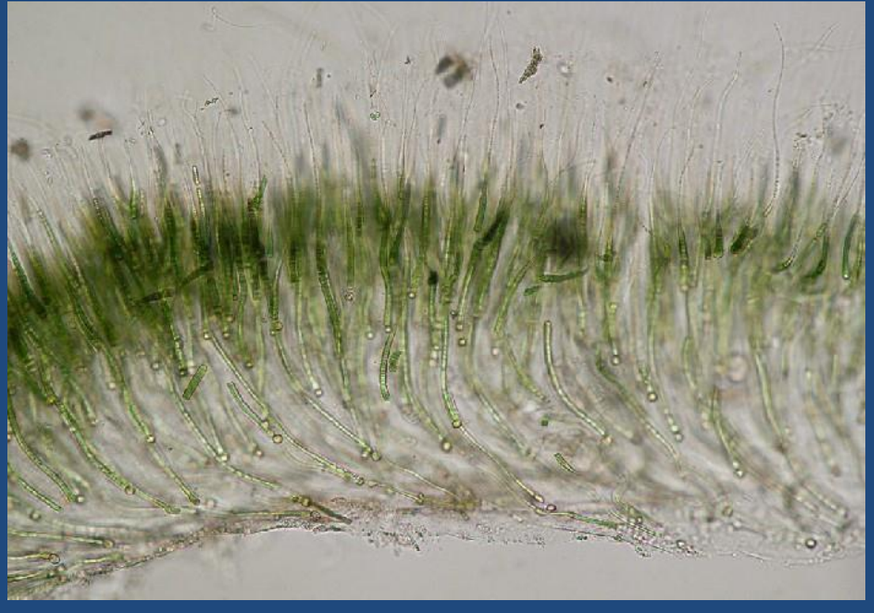


Fig. 2.52. Cyanobacteria. *Rivularia*. Trichome attenuated from base to apex and possess basal heterocysts.





Gloeotrichia sp.

1. Is present in lakes and forest watershed.
2. **Spherical colonies.**

3. The mucilaginous sheath is top short at the apex.

4. Heterocysts are usually spherical in appearance. Trichomes are tapered at the apical region. **Vegetetive cells are shorter and barrel shaped.**

5. The sheaths are **firmly attached at the basal region**.
6. **Each trichome has an akinete. Akinetes tare adjacent the heterocyst.**
7. **Reproduction by hormogonia, akinate and heterocyst.**

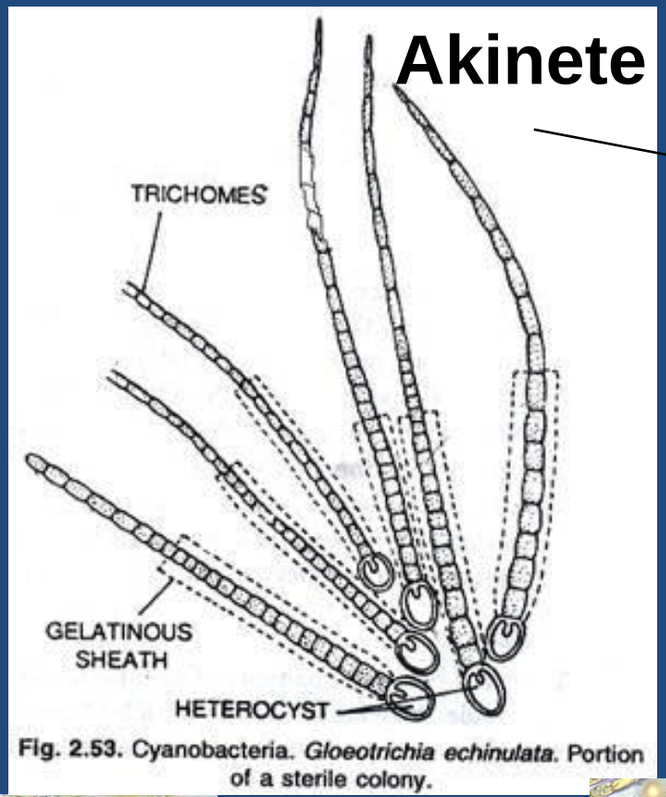


Fig. 2.53. Cyanobacteria. *Gloeotrichia echinulata*. Portion of a sterile colony.

Gloeotrichia colony

Q & A