

## Practical No. 10

**Aim :** To study the biofertilizers - a. *Azolla* b. *Anabaena* c. *Azotobacter* d. *Nostoc*.

**Apparatus :** Specimens / permanent slides of *azolla*, *anabaena*, *azotobacter*, *nostoc*.

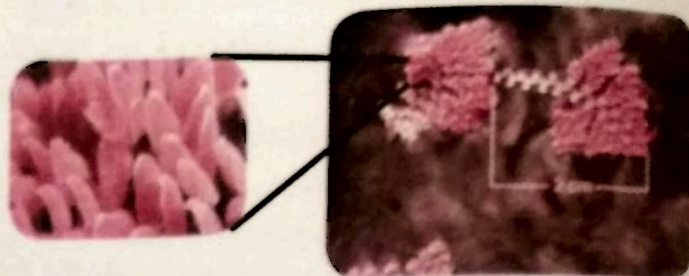
**Procedure :**

1. Observe the specimens and study their characteristics.
2. Label the diagrams shown below.

**Observation :**

a. *Azolla*

Kingdom	- Plantae
Division	- Pteridophyta
Example	- <i>Azola</i>

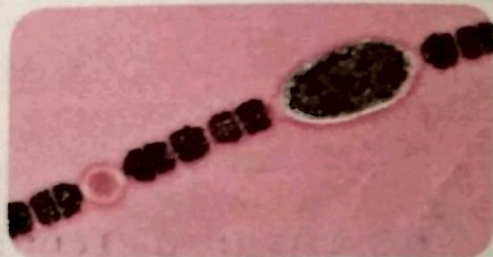


**Characteristics :**

1. Found floating on steady water reservoirs like ponds, lakes etc.
2. 2.5cm long triangular leaves.
3. They create a velvety layer on the water as the leaves have soft bristles on them.
4. They destroy worms in the water due to their wormicide nature.
5. Cyanobacterium (*Anabaena azolli*) present in the leaves fix atmospheric nitrogen.

b. *Anabaena*

Kingdom	- Bacteria
Division	- Cyanobacteria
Example	- <i>Anabaena</i>



**Characteristics :**

1. These are filamentous bacteria living symbiotically with *azolla*, mosquito fern.
2. They fix atmospheric nitrogen.
3. Found in paddy fields and act as natural fertilizer.
4. Animals stay away from them, as they produce neurotoxins that harm nervous system.

c. *Azotobacter*

Kingdom	- Bacteria
Division	- Proteobacteria
Example	- <i>Azotobacter</i>

**Characteristics :**

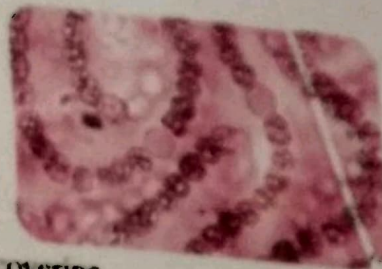
1. Round or oval bacteria with a diameter 1-2 micrometer.
2. Have ability to create hard crust around themselves.
3. Live independently in soil.
4. They fix atmospheric nitrogen.





d. Nostoc  
Kingdom  
Divison  
Example

- Bacteria
- Cyanobacteria
- Nostoc



#### Characteristics :

1. These bacteria look like strings embedded in gelatinous casing/covering.
2. They are found in soil, wet rocks and bottoms of water reservoirs.
3. Live independently or symbiotically. They supply nitrogen to the host when they are symbiotic.
4. Autotrophic, as the cell has chlorophyll.
5. Used as food because it contains vitamins and proteins abundantly.

#### Conclusion :

1. The bacteria anabaena found in azolla, mosquito fern function as biofertilizers.
2. Azotobacter living independently in soil, fix atmospheric nitrogen.
3. Nostoc - the bacteria found in soil, wet rocks and water bottoms have ability of photosynthesis.

#### Multiple Choice Questions

1. The wormicide character of ..... destroys worms in water.  
a. azotobacter      ☒ b. azolla      c. nostoc      d. none of these
2. The bacteria nostoc are used as food because they have abundant amount of ..... and .....  
☒ a. proteins and vitamin C      b. carbohydrates and lipids  
c. water and vitamin D      d. carbohydrates and proteins
3. The bacteria ..... supply natural manure to paddy fields.  
a. azolla      ☒ b. anabaena      c. azotobacter      d. nostoc
4. Which of the following bacteria can perform photosynthesis?  
a. anabaena      b. azotobacter      ☒ c. nostoc      d. non of these
5. Nitrogen fixing bacteria - anabaena - are found in the plant .....  
a. anabaena      b. pistia      c. salvinia      d. marselia

#### : Exercise :

Why does the microbes plays an important role in agricultural management?

Some microbes are useful for agriculture (such as Rhizobium, Anabaena) but some are harmful to agriculture. ex, Viruses.

If we increase the population of that microbes then it will good for us. therefore they play an important role in agriculture.



Remark and Signature