STORY OF MICRO ORGANISMS - 1

Why do we add some drops of butter milk to lukewarm milk to make curd?

Why does even cooked food get spoiled after some days? Why do we get bad smell from our mouth after we wake up in the morning?

In this chapter we will try to find out what may be involved in causing such changes.

400 years back several people wondered over such questions and tried to find out answers.

One such person was Antonie van Leeuwenhoek.

Story of Microscope invention and discovery of micro organisms

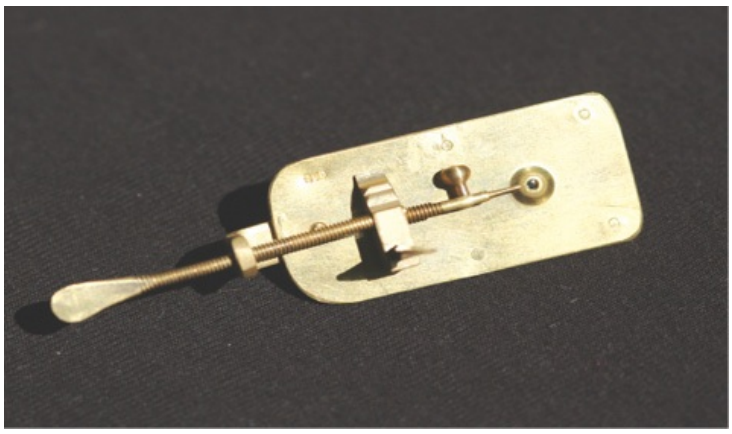

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Fig.1: Anthony van Leeuwenhoek ***Fig.1(a): Single lens powerful microscope***

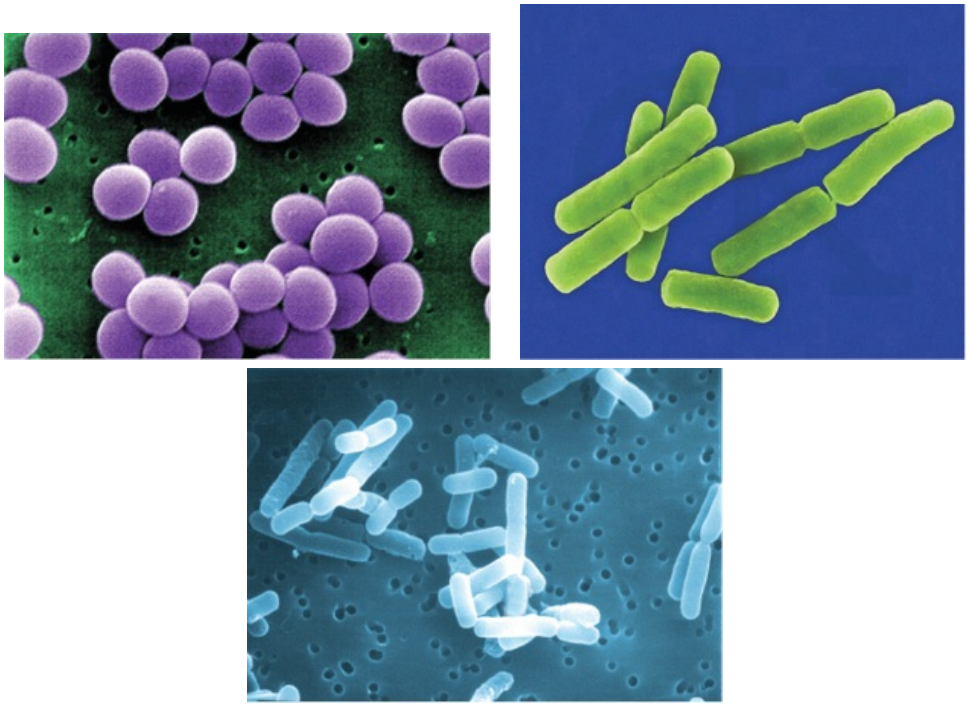
Microbiology as a science was born in 1674 when Anthony van Leeuwenhoek observed a drop of lake water through a glass lens that he had carefully found. Anthony van Leeuwenhoek was a fabric merchant. Leeuwenhoek built a single lens powerful microscope, which could magnify the object 300 times. His curiosity and skill of making

powerful lenses were the secrets of this invention of powerful microscope. His keen observation of different things under his microscope helped him to discover small moving organisms in 1678. He called them “animalcules.” Later these were named bacteria. Along with the animalcules, he also observed many other microorganisms under his microscope which got their respective names later on. This helped further discoveries of other microorganisms.

Now let us see what are microorganisms and where we can find them.

Microorganisms

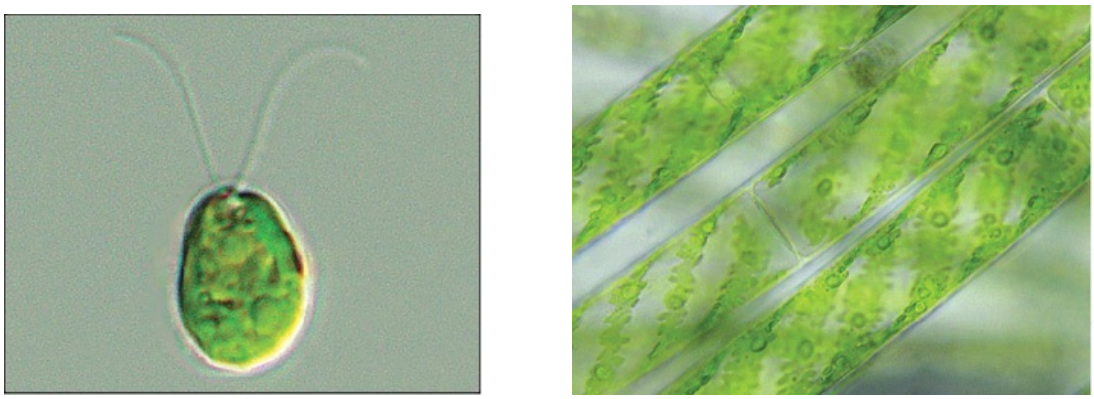
We can see several organisms in our surroundings but we can not see many of them with our unaided eyes. They can be seen only with the help of a microscope. They are called microorganisms. Some of the microorganisms are shown in Fig-2-6.

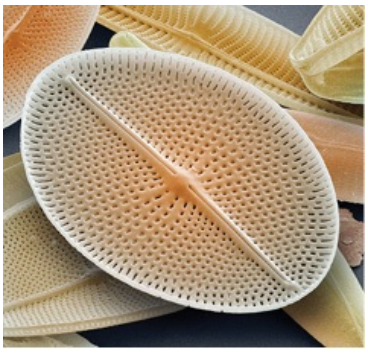


Cocci Bacteria *Bacillus Bacteria*

Lacto bacillus

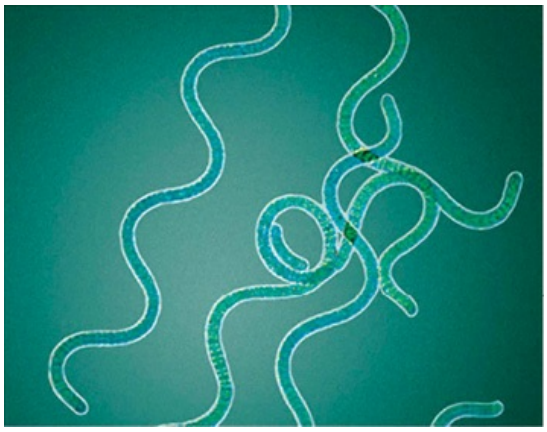
Fig-2 Different Bacteria





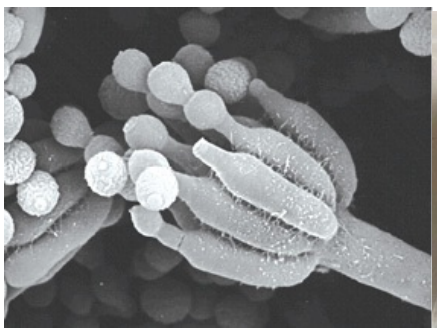
(a) Chlamydomonas *(b) Spirogyra* *(c) Diatom*

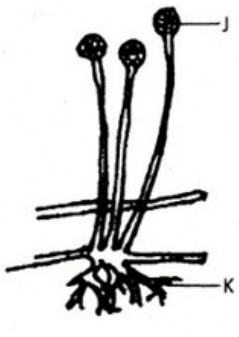
Fig-3(a) : Algae

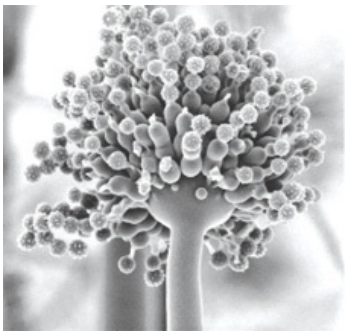


(d) Spirulina *(e)Oedogonium* *(f) Ceratium*

Fig-3(b) : Algae

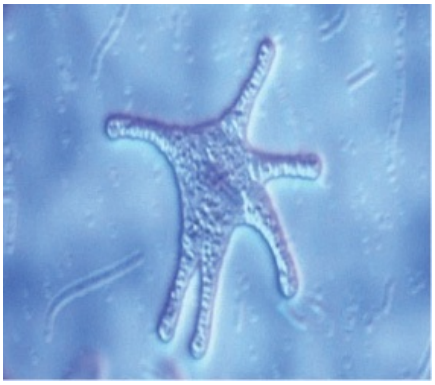


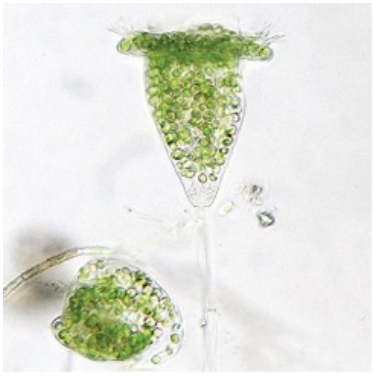




Penicillium ***Bread mould*** ***Rhizopus*** ***Aspergillus***

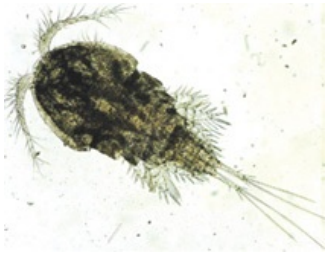
Fig-4 Fungi

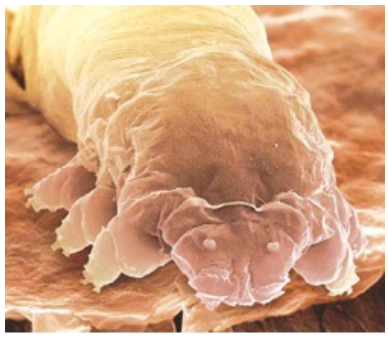




Amoeba ***Paramoecium*** ***Vorticella***

Fig-5 Protozoa





(a) Cyclops *(b) Daphnia* *(c) Scabies mite* *(d) Eyelash mite*

Fig-6 Micro Arthropods

Groups of microorganisms

Let us study some micro organisms that belong to the groups like Bacteria, Fungi, Protozoa, Algae and certain micro arthropods with the help of some activities.

For this we will need a Microscope. You already know how to use it. You could also refer to "Chapter Cell- Basic unit of life".

Activity-1

Collect some pond water / or water from any tank in your surroundings. To take some of the greenish scrapings from the side of the tank. Take 1-2 drops of water (from the sample you have collected) on a slide and observe through Microscope. Draw rough sketches in your note book of what you observed. Compare it with the figures given above for observation and identification (You may also hold discussion with your friends). Take the help of your teacher as well.

Can you name the organisms which you have observed through the microscope?

We will try to know more about the microscopic world by doing the following activities.

Observing Fungi

Usually after the rainy season you might have seen some small umbrella like growths over rotten materials of dumped waste, between the grasses in a field and edges of wet rotten wooden planks. Often you might have observed white patches on the bark of trees. These patches are formed due to Fungi. Now let us look at them more closely by the following activity.

Activity-2

Take some rotten part of vegetable or black spoiled part of bread or coconut with the help of a needle on a slide. Put a drop of water, place a cover slip on it and observe it under the microscope.

Fig. 8(a) Photograph of curd in bowl

Draw rough sketches in your note book of what you observed. Take the help of the figures given in fig-3 bread mould - Rhizopus and compare.

Observing Bacteria

We can see bacteria in butter milk or curd or early morning scraping of tongue (before washing the mouth). We can also find them in the soil, over bark of trees, over our skin, in our arm pits and many other places. But they are invisible to the unaided eye. Now let us look at them more closely by the following activity.

Activity-3

Take one or two drops of butter milk on a slide and spread it. Heat the slide slightly on a lamp (3-4 seconds). Add a few drops of crystal violet, leave it for 30 to 60 seconds and wash the slide gently with water. Observe the slide under the compound Microscope. Draw rough Sketches in your note book of what you have observed.

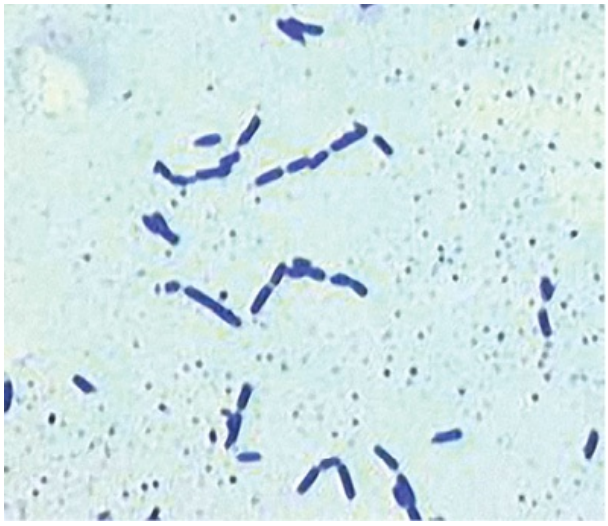


Fig-8(b) Stained lactobacillus bacterium

Do you know?

There are several bacteria growing on our skin. Many of the disease causing ones live in some symbiotic relations with other Bacteria. There are different kinds of bacteria in our intestine which are useful in digestion. Bacteria are found everywhere in lacks in soil, water, air etc. (Recently two types of bacteria in 1997 Heide N. Schulz discovered. A biggest bacteria Thiomargarita namibiensis found in coastal waters of Namibia (0.75mm), which can be seen with unaided eye.)

Observing Algae

Very often we observe greenish pond water in our surroundings. It is greenish because of growth of Algae and other plants which grow in water. We can see some of Algae like Chara, Spirogyra etc. with unaided eye, but most of the algae present in water are microscopic.

They can be observed only through a microscope. Let us collect pond water or water from the tanks with a bit of greenish scrapings. To observe some of the micro algae growing in water, let us do the following activity.

Activity-4

Select a few strands (green string like bodies) or some part of the scrapings that have small string like bodies. Take one or two drops of collected greenish pond water (in a bottle) on a slide. Cover it with a cover slip and observe through microscope**.** Draw rough sketches in your note book of what you have observed. Compare with fig-6.

Observing Protozoa

The other group of microorganisms is protozoa. They are yet another group of microorganisms present in water and soil. Let us do the following activity to observe them.

To grow Protozoa, soak hay in pond water to prepare a decoction of hay. After 3- 4 days take a drop of water and observe it under the compound microscope.

Activity-5

Take one or two drops of hay decoction on a slide and observe it under the microscope**.** Draw rough sketches in your note book of what you have observed. Take the help of the figures given in the chapter for observation.

Do you know?

Micro arthropods

Some micro arthropods are very important for the soil. They help in increasing soil fertility by decomposing the biomass through digestion which converts the bigger compounds into smaller compounds. These are to be found on our skin, eyelids, beddings, rugs etc.

Some micro arthropods cause diseases like scabies e.g.: scabies mites. Actually these are not micro organisms like bacteria, but they are minute arthropods and also called joint legged organisms.

Do you know?

Soil is highly rich in microorganisms such bacteria, fungi, protozoa, micro arthropods. The top eight inches of soil of one acre area may contain as much as five and half tons of fungi and bacteria. This is very much useful for growing crops. But excess use of pestisides kills these micro-organisms. We can see them through a microscope or by growing them in different media.

Let us do the following activity to observe some soil microbes.

Activity-6

Observing soil micro-organisms

Collect some soil from the field in a beaker or in a glass. Add some water to it and stir it. Wait for some time to allow the soil particles to settle down. Take a drop of water on a slide and observe it under the Microscope. Draw rough sketches in your note book of what you observed.

Take the help of the figures given in the chapter for observation.

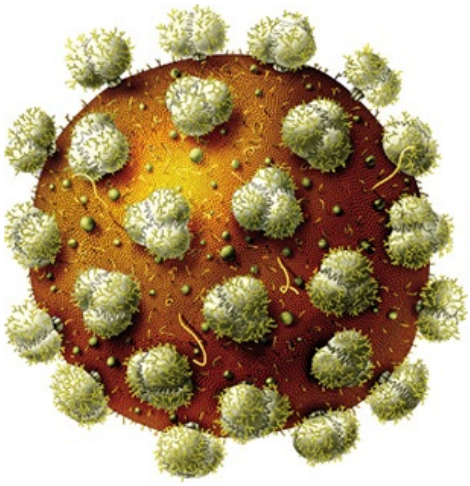
From the above activities you will be able to understand how diversified the microorganisms are. You can also appreciate the fact that this is another amazing world of living organisms.

Let us try to find out where else we can find them.

Microorganisms are present everywhere around us. They are present in air, water and in the soil too.

Do you know?

Viruses are an interesting type of microorganisms. They behave like non living things when they are outside a living cell. But they behave like living organisms when they are inside host living cells and reproduce just like bacteria, plants or animals.



HIV

(Fig.9 Electron Microscopic view of some Viruses)

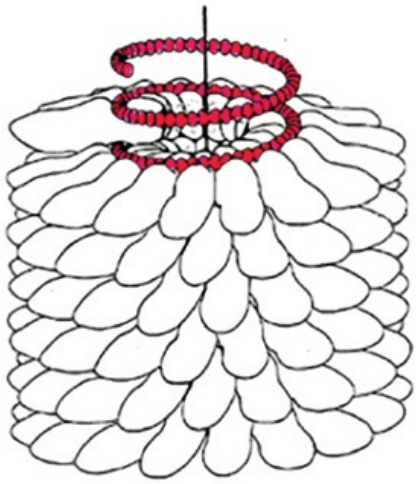


Fig. 10 **Tobacco Mosaic virus**

They can only be seen through very powerful electron microscope.

Diseases like polio, swine flu, conjunctivitis, smallpox, chickenpox and AIDS are caused by viruses.

They are also present inside the bodies of animals and plants. They can survive in all types of environments ranging from ice cold climate to hot springs, deserts to marshy lands. Some microorganisms grow on other organisms as parasites and some may exist independently.

Diseases like typhoid, tuberculosis (T.B) and septicemia (blood poisoning) are caused by bacteria. Some of the skin diseases are caused by fungi while others by micro arthropods and bacteria. Diseases like Malaria, Amoebiasis are caused by Protozoans**.**

Do you know?

Bacterial Staining?

Bacteria are very small/ tiny micro-organisms. We must stain before seeing Bacteria under Microscope. Smear bacteria on a slide and slightly heat the slide. Then put drops of crystal violet on the slide. After 30 to 60 seconds gently wash the slide. Dry the slide and now watch the slide under the microscope in **25 X or 40 X.**

Key words

Microorganism, Microscope, Microbiology, Bacteria, Fungi, Protozoa, Algae, micro Arthropods, Virus, discovery, invention

What we have learnt

- Microorganisms are very minute living things. We cannot see them with our naked eye.
- We can see microorganisms with the help of Microscope.
- Antonie van Leuwenhoek invented a powerful single lens microscope.
- Microbes are present everywhere in our surroundings.
- Bacteria, Fungi, Protozoa, and Algae are major groups of microorganisms.
- Viruses are special type of microorganisms, which lie between living and non living organisms. They can reproduce only in host living cells.

Improve your learning

1. Which organisms are interlinked between living and non-living organisms? Why do you think so? (AS1)
2. What are micro-organisms? Do you find them? (AS 1)
3. What type of micro organisams we can observe in pond water? (AS1)
4. Whether micro-organisms are useful and harmful. How explain.(AS1)
5. How are the human actions causing the death of useful bacteria and fungi? What will happen if it continuous? (AS 1)
6. Why the coocked food spoil soon but not uncoockced food. Give your reasons.(AS1)
7. What questions would you like to ask your teacher to know about different shapes of Bacteria? (AS2)
8. What will happen if you add buttermilk to chilled milk? (AS2)
7. How do you observe Lactobacillus bacterium? (AS 3)
8. Visit any bakery or milk chilling center near your school with the help of your teacher or parents. Learn about some techniques to culture and usage of some Microorganisms and prepare a note on them.(AS 4)
9. Observe some permanent slides of microorganisms in your school lab with the help of microscope. Draw its picture. (AS 5)
10. Prepare a model of any microorganism. And write a note on them. (AS 5)
11. Why should we clean our hands with soap before eating?(AS 7)