

## Microorganisms :



**Bacteria:** These are single-celled organisms with a rigid cell wall. They can only be seen under a microscope which enlarges images from 100 to 1000 times.

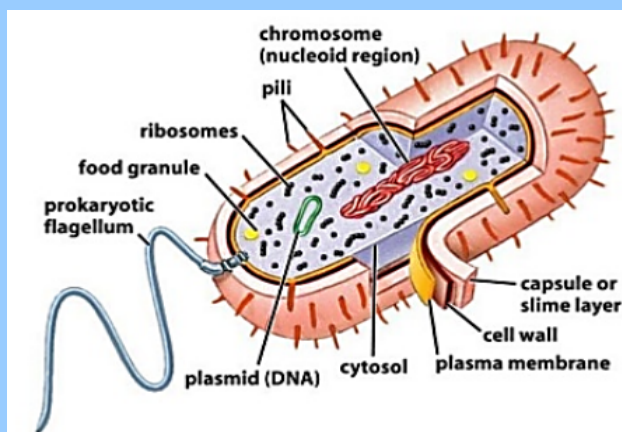
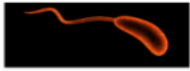
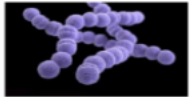
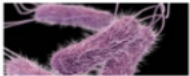


Fig 1: Ultrastructure of a Bacterial Cell

## Types of Bacteria (based on their Shapes) and their Examples

| Shape of Bacteria                 | Example   | Image                            |
|-----------------------------------|---|----------------------------------|
| Comma-shaped Bacteria             | <br><b>Fig 3: Vibrio Cholera</b> | Vibrio Cholerae                  |
| Spherical-shaped Bacteria (Cocci) | <br><b>Fig 3: Streptococcus</b>  | Staphylococcus and Streptococcus |
| Rod-shaped Bacteria (Bacilli)     | <br><b>Fig 4: Salmonella</b>     | E.coli and Salmonella            |

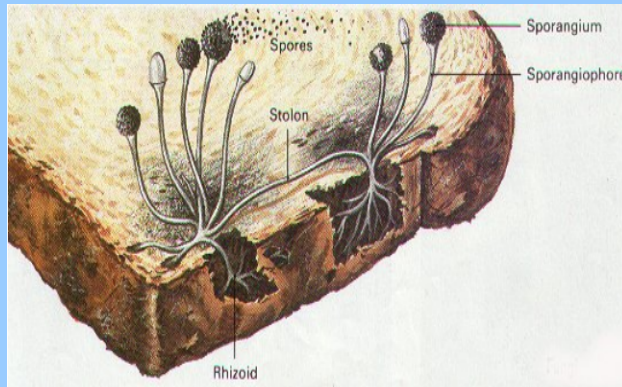


**Table 2: Shapes of Bacteria (with Examples)**

**Fungi:** These are non-green plants and hence, cannot make their own food. They either live as parasites (deriving nutrition from host organisms, for example, Puccinia which causes wheat leaf rust) or grow on the organic matter (such as bread mould).



**Fig 7: Puccinia triticina**



**Fig 8: Bread Mould**

Fungi, like mushrooms, moulds, mildews, and yeasts, are eukaryotic. It means that they have a true nucleus.

**The main components of fungi are:**

- i. **Hyphae**: They are thread-like filaments which penetrate into substrates, secrete enzymes to break down nutrients into smaller molecules, and absorb them.
- ii. **Spores** are a unit of sexual or asexual reproduction. They can adapt for dispersal and survival for extended periods of time in unfavourable conditions.

**Algae** : These are simple plant-like organisms which are usually aquatic in nature. They contain a cell wall and chlorophyll and can make their own food by photosynthesis. Algae can be unicellular or multicellular. Some of the common examples are diatoms, Chlamydomonas, and seaweed.

**Protozoa**: Protozoa are unicellular organisms. Some of them live independently while others live as parasites. Many of the parasitic protozoans cause diseases in plants, domestic animals, and human beings. Examples of some protozoans are Amoeba, Plasmodium and Paramecium.

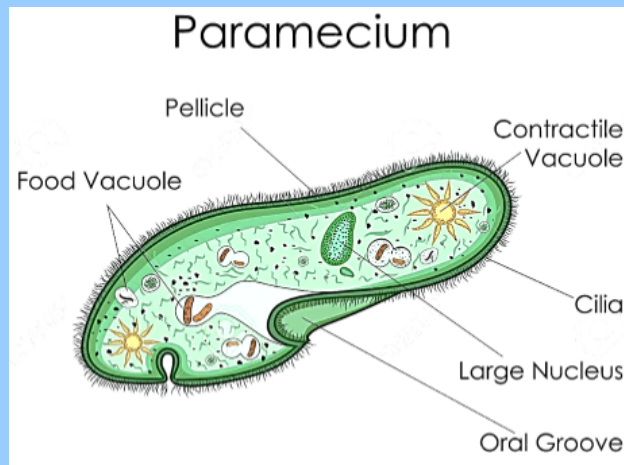
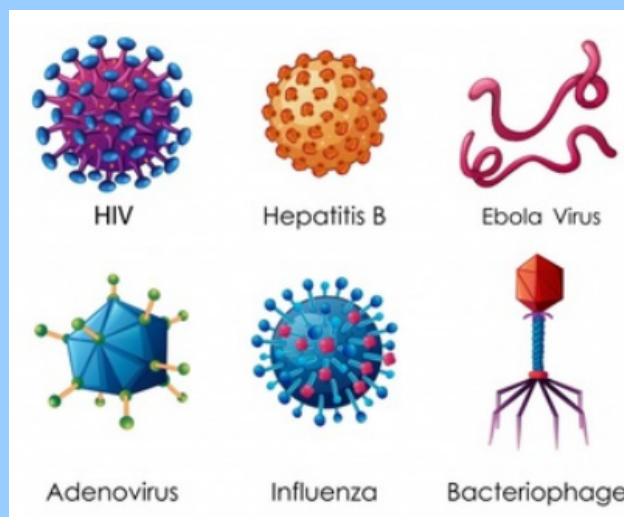


Fig 9: Paramecium

### How are Viruses different from other microbes?

Viruses are microscopic organisms but they are different from other microbes because they reproduce only inside the cells of the host organism (which can be a plant, animal, or a bacterium).



## Fig 10: Types of Viruses

Viruses are much smaller than bacteria and come in a wide variety of shapes and sizes. A complete virus particle is known as Virion.

**Virion** consists of a nucleic acid surrounded by 'capsid'. Capsid is a protective coat made of protein. The subunits of this protein called 'Capsomeres'. Viruses can be seen only by an electron microscope as they are ultramicroscopic in size.

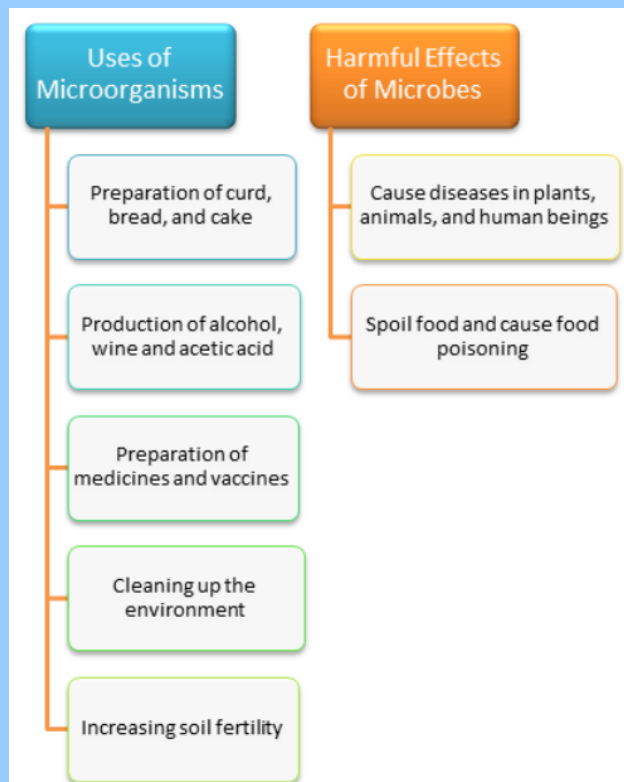
Outside the body of a living organism, they do not show any reaction and hence, can be crystallized and stored like non-living things.

## Where do Microorganisms Live?

Microbes can survive in all kinds of environments – from icy cold climates to hot springs (any kind of temperature); and deserts to marshy lands (any humidity level). Some live independently while others live as parasites – inside the bodies of other organisms (including animals and human beings).

## Microorganisms and Us

Some microorganisms are beneficial to us while others are harmful and cause diseases.



How are bacteria useful to us?

***How is curd formed?***

*A bacterium called Lactobacillus multiplies in milk and converts it into curd.*

Bacteria are helpful because:

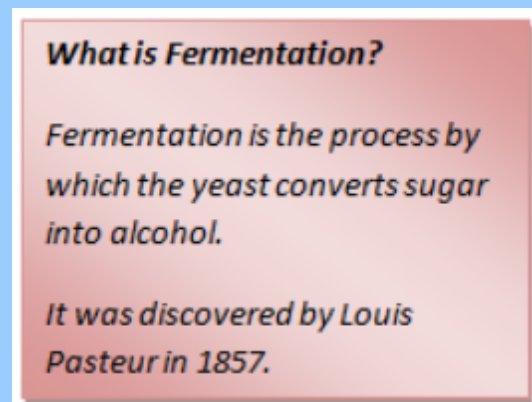
It decomposes organic wastes (such as vegetable peels, animal remains, and faeces etc.).

It is used in the preparation of medicines.

It increases soil fertility by fixing nitrogen.

It is used in the setting of curd and making cheese, pickles, and other food items.

**How is yeast useful to us?**



Yeast is used in the baking industry (to make bread, pastries, and cakes) because it helps in fermentation. It reproduces rapidly and produces carbon dioxide during respiration. Bubbles of the carbon-dioxide gas it produces fill the spaces in the dough and increases its volume.

It is also used in the commercial production of alcohol and wine which is done by growing yeast on natural sugars present in fruit juices and grains **like rice, wheat, and barley.**

## **Antibiotics**

**What are Antibiotics? What are their uses?**

Antibiotics are medicines that can kill or stop the growth of disease-causing microorganisms. For **Example**, Penicillin.

***Who discovered Penicillin and when?***

*Alexander Fleming in 1929.*

### **Antibiotics are used to:**

Cure a variety of diseases (such as streptomycin, erythromycin, and tetracycline that are made from bacteria and fungi),

Cure microbial infection in animals (by mixing antibiotics with the feed of livestock and poultry), and

Control several plant diseases.

### **What precautions should be followed while taking antibiotics and why?**

Antibiotics should be taken only on the advice of the doctor, and one must complete the course the doctor prescribes.

Antibiotics taken in wrong doses may make the body resistant to the drug and it may not be effective in the future. Moreover, antibiotics may also kill the beneficial bacteria in the body.

**Please Note:** Antibiotics cannot cure cold and flu caused by viruses.