

Revision Notes on Microorganisms: Friend and Foe

What are Microbes?

Microbes or microorganisms are tiny organisms which are so small that we cannot see them with an unaided eye. Some microorganisms can be seen with the help of a magnifying glass (such as fungus that grows on bread) while some can only be seen when you use a microscope (such as bacteria and protozoa). Microorganism were first observed by Anton Van Leeuwenhoek.

Causes	Diseases
Viruses	Common Ailments: Cold, Cough, and Influenza (or Flu) Serious Diseases: Polio, Chicken Pox, Measles etc
Bacteria	Typhoid and Tuberculosis (TB) etc
Protozoans	Dysentery and Malaria etc

Microorganisms :

There are four major types of microorganisms:

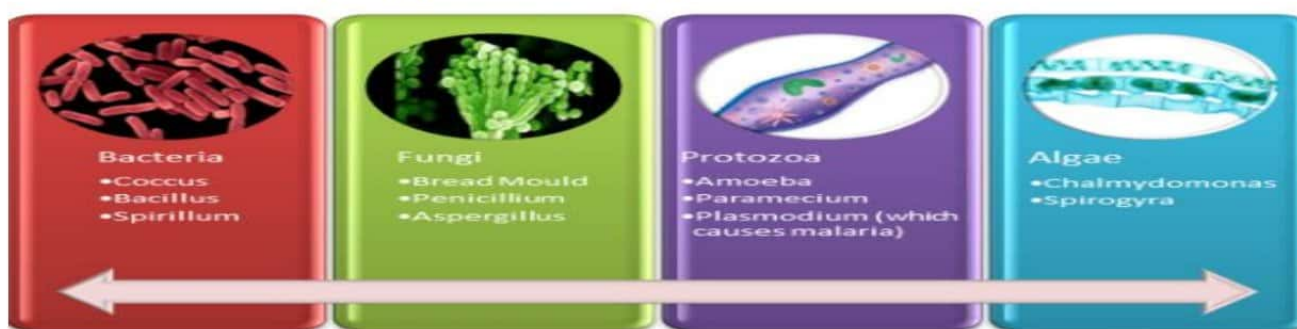


Fig 1: Types of Microorganisms

- **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.

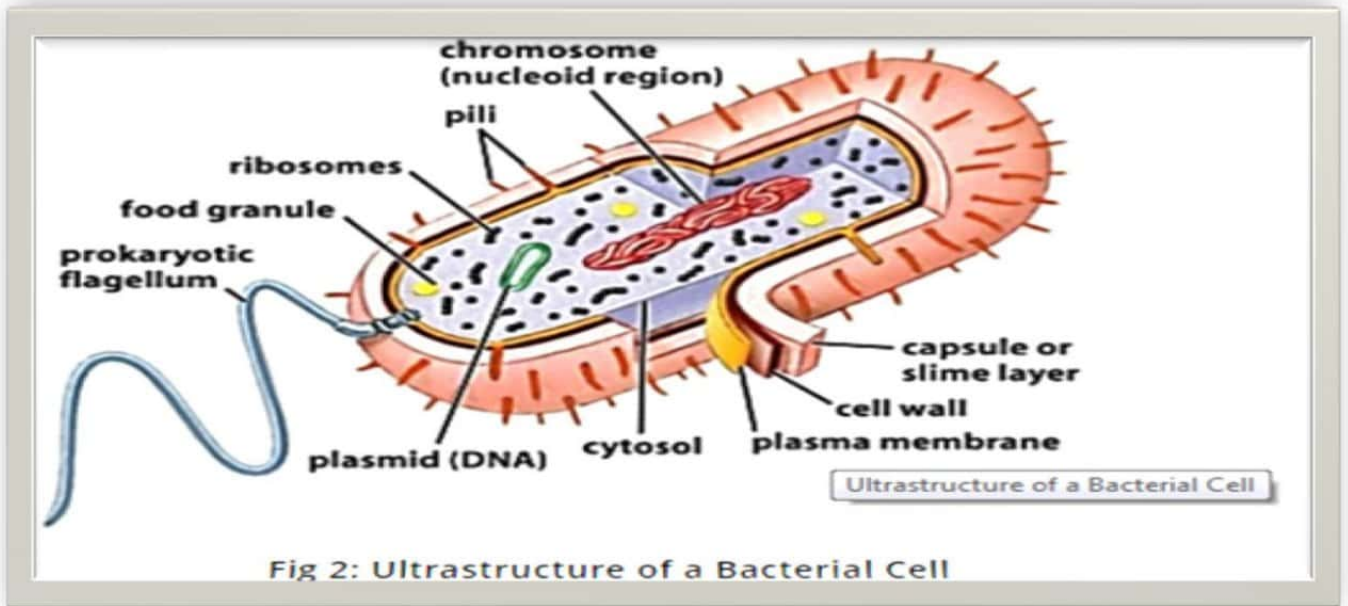
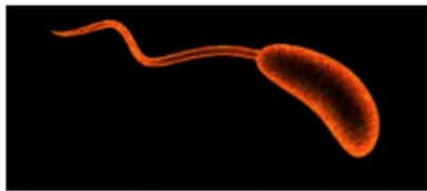
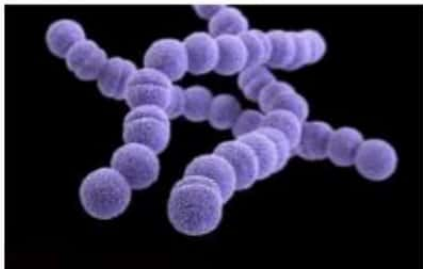



Fig 2: Ultrastructure of a Bacterial Cell

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

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

Spiral-shaped
Bacteria (Spirilla)

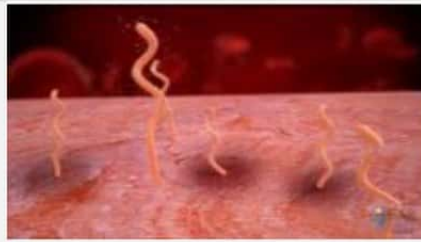


Fig 5: Borrelia

Treponema and Borrelia

- **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

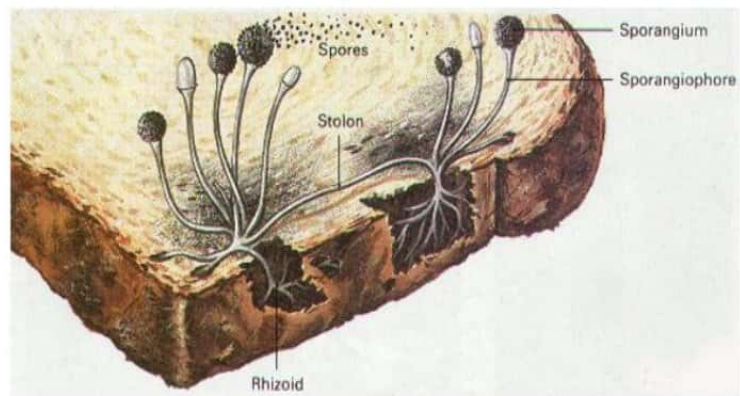


Fig 8: Bread Mould

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

The main components of fungi are:

- Hyphae:** They are thread-like filaments which penetrate into substrates, secrete enzymes to break down nutrients into smaller molecules, and absorb them.
 - 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. Example of some protozoans are *Amoeba*, *Plasmodium* and *Paramecium*

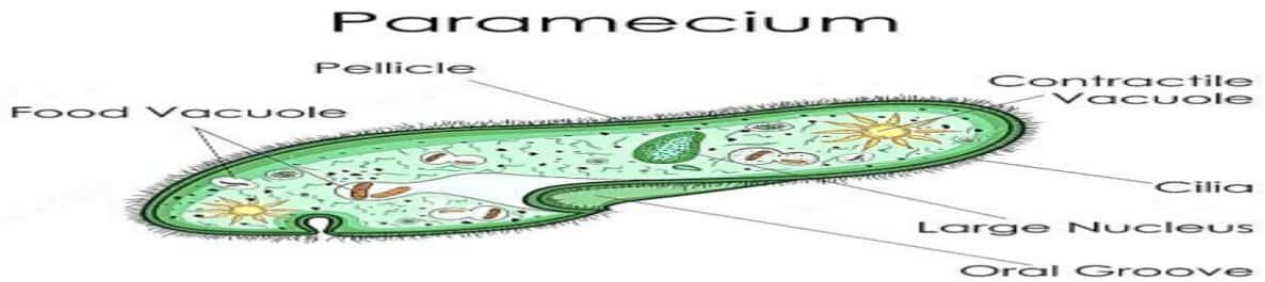


Fig 9: Paramecium

❖ 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).

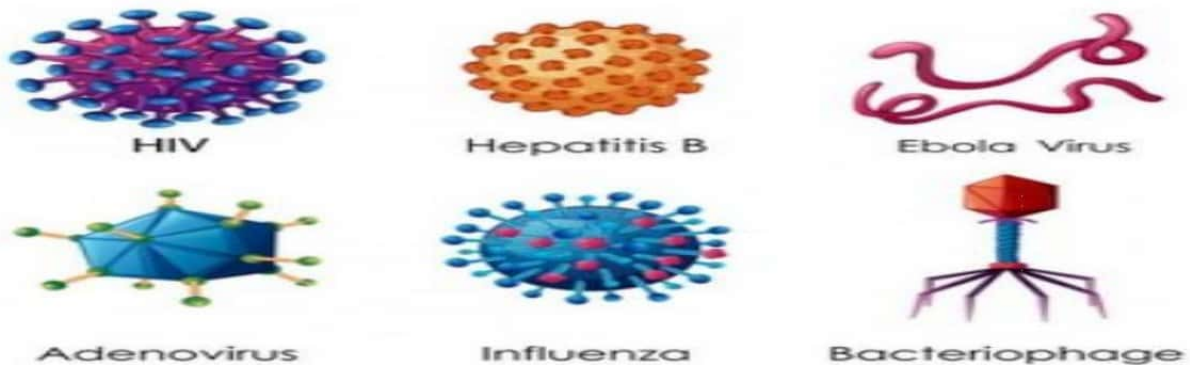


Fig 10: Types of Viruses

- 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.

❖ Next Topic: Where do Microorganisms Live?