What are Microorganisms?

MICRO-ORGANISMS

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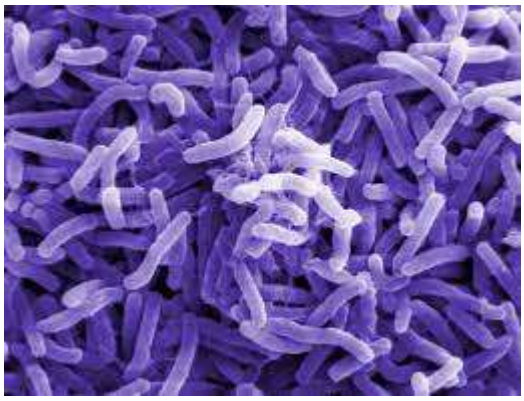
Very small Living plant or animal

- They are living organisms of very small size. They are so small that they cannot be seen by naked eye.
- We would require a microscope or magnifying glass to see them.
  Example: Bacteria, Fungi
- There are four major groups:
  Bacteria
  Fungi
  Protozoa
  Algae

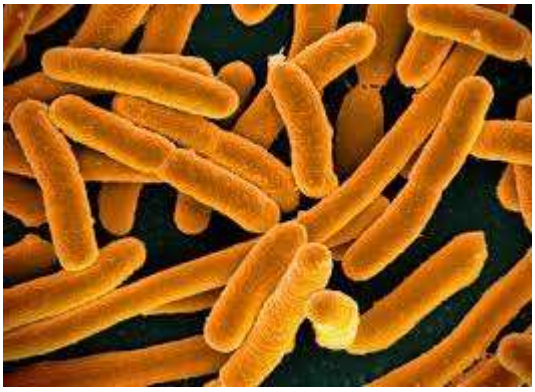
Viruses are also microscopic, but are quite different from other microorganisms. They grow only inside cells of other plants and animals.

Different types of microorganisms:

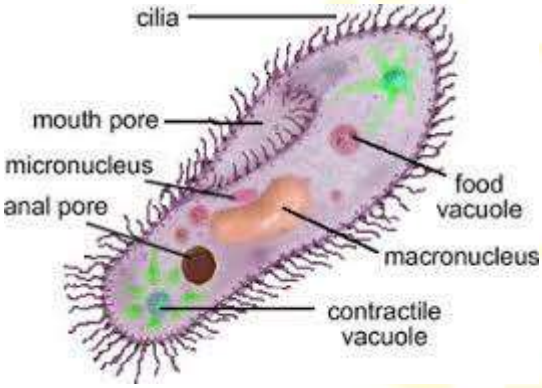
Type of Microorganisms	Description	Examples
Bacteria	They are small single cell organism having cell wall but no nucleus. They can be spherical, spiral or rod-shaped.	Lactobacillus, Rhizobium
Fungi	They are microorganisms containing nucleus. They look like plants but cannot prepare their own food. They do not contain chlorophyll and cannot photosynthesise.	Yeasts, moulds
Protozoa	They are animal like microorganisms. Most of these are parasites and feed on other organisms.	Amoeba, Paramecium
Algae	They are plant like microorganism. They contain chlorophyll and do photosynthesis to make food.	Chlamydomonas, Spirogyra



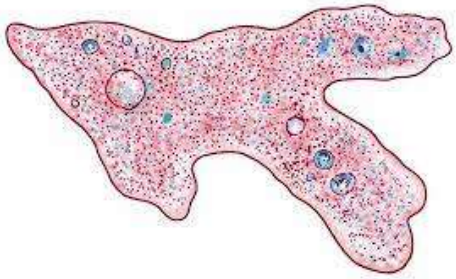
Spiral shaped



rod shaped



Paramecium



Amoeba

chlamydomonas

spirogyra

Virus

- These are microorganisms that reproduce only inside cells of other plants and animals.
- These are agents of various diseases like cold and flu (Influenza)
- Viruses also cause serious diseases like Polio and Chicken pox.

Important points about Microorganisms

- Microorganisms can be single-celled or multicellular.
- Some are made of single cell (unicellular) example: Protozoa, bacteria.
- Some are made of many cells (multicellular) example: Algae, Fungi.
- They live in all type of environment from ice cold climate to hot springs and deserts to marshy lands.
- Some live inside other organisms including humans.

Microorganisms and Us

- Microorganisms are both good and bad for us.
- Some are beneficial to us while others are harmful and cause diseases.

Friendly Microorganisms

- They help in making curd, bread and cake. Milk is converted to curd by multiplication of bacteria.
- Bacteria and yeast also help in fermentation of rice idlis and dosa batter.
- Yeast is used for making bread, pastries and cakes.
- They clean up the environment. For example, breaking down organic waste into harmless and reusable substances by bacteria. They also increase soil fertility by fixing nitrogen.

Commercial use of Microorganism

- They are used for commercial production of alcohol, wine and vinegar.

Medicinal uses of Microorganisms

- Some microorganisms are also used as medicines. Examples Antibiotics and Vaccines.

Antibiotics

- There are some microorganisms which are good for us and fight against the harmful microorganisms.
- Antibiotics are medicines which stops the growth of disease -causing microorganisms.
- Example: Penicillin, Streptomycin, Tetracycline.

Vaccine

- Vaccines are prepared from microorganisms.
- These vaccines help the body in making antibodies which fight these microorganisms and prevent diseases in future.
- Examples: Polio drops given to children up to age of 5.
- Vaccine for Cholera, Hepatitis, smallpox etc.

Harmful Microorganisms

- Some microorganisms harm in different ways.
- Some cause diseases in humans, plants and animals. Such disease-causing microorganisms are called **Pathogens**.
- Some spoil food, clothing and leather.

Disease causing microorganisms in Humans

Human Disease	Causative Microorganism
Tuberclosis	Bacteria
Measles	Virus
Chicken Pox	Virus
Polio	Virus
Cholera	Bacteria
Typhoid	Bacteria
Malaria	Protozoa

Diseases caused by microorganisms in animals

Name of the Disease	Causative Microorganism
Anthrax	Bacteria
Foot and mouth disease	Virus
Aspergillosis	Fungus

Diseases caused by microorganisms in Plants

Name of the Disease	Causative Microorganism	Transmitted by
Citrus Canker	Bacteria	Air
Rust of wheat	Fungi	Air, seeds
Yellow vein mosaic of ladyfinger	Virus	Insects

Food Poisoning

- Food poisoning could be due to the consumption of food spoilt by some microorganism.
- Microorganisms that grow on our food sometimes secret toxic substances.
- These make food poisonous causing serious illness and even death.

Food Preservation

- It means preventing food from spoiling and getting rotten.
- It is done by adding preservatives for example salt, sugar etc to food.

Preservation by common salt

- Common salt is used on meat and fish to prevent growth of bacteria.
- It is also used to preserve fruits such as raw mangoes, lemon and amla.

Preservation by sugar

- Sugar is used in Jams, Jellies and squashes.
- Fruits that are preserved in the form of jams and jellies are Apple, Mango, Strawberry, Guava, Orange etc.
- Sugar inhibits the growth of bacteria that spoil the food.

Preservation by oil and vinegar

- Oil and vinegar are used to preserve pickles.
- Vegetables, fruits, fish and meat are preserved by this method.

Heat and cold treatments

- Milk is boiled to kill microorganism so that the milk can last longer.
- Low temperatures inhibit the growth of microbes. This is why food is stored in refrigerator.
- **Pasteurisation:** In this process milk is heated to $70^{o}C$ for 15 – 30 sec and then suddenly chilled and stored. This prevents the growth of microbes. This process was discovered by Loius Pasteur.

Chemical treatment

- Chemicals such as Sodium Benzoate and Sodium Metabisulphite are used as common preservatives.
- These are also used in jams and squashes to check their spoilage.

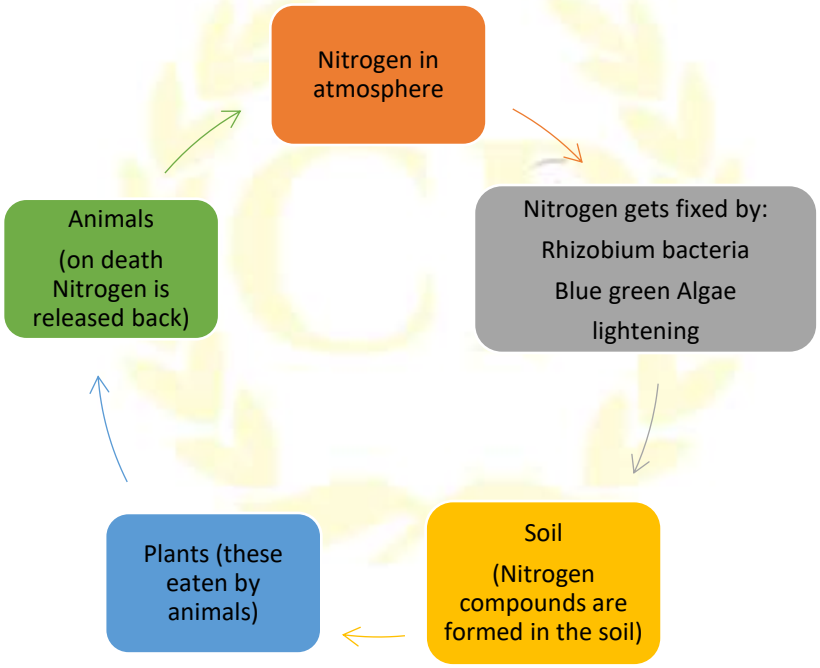
Storage and Packing

- Nowadays, dry fruits and even vegetables are sold in sealed air tight packets to prevent attack of microbes.

Nitrogen Fixation

- The process by which atmospheric nitrogen is converted to Nitrates and Nitrites which can be used by plants is called Nitrogen Fixation.
- These nitrogen compounds are used for synthesis of plant protein.
- Nitrogen can be fixed by
    - Nitrogen fixing bacteria in the soil.
    - Rhizobium bacteria – which lives in the root nodules of leguminous plants such as beans and pulses.
    - By Blue green algae
    - By Lightening

Nitrogen Cycle



Atmosphere has 78% Nitrogen. This nitrogen gets fixed by

- Rhizobium bacteria
- Blue- green algae
- Lightening

Thus, nitrogen in air gets converted into Nitrogen compounds, which are nutrients for the soil.

Plants consume these nutrients.

Animal eats plants and get Nitrogen.

Both plants and animals die / excrete waste.

Bacteria converts the waste back to nitrogen.