

# Hour: 5 Microbial System: History - types of Microbes.

II-5

## Microbial System:-

Complex communities of microorganisms, including bacteria, archaea, virus, fungi and protists, that interact with each other and their environments.

Microbial Systems are fundamental to all life on earth, driving processes such as nutrient cycling, disease progression and biogeochemical transformations.

## History:-

### Early observations:

Egyptians used fermentation to produce bread & beer.

Antonie van Leeuwenhoek was called as "Father of Microbiology".

### Development of Microbial Theory:

Louis Pasteur laid the foundation for the germ theory.

Robert Koch found the relationship between microbe & disease.

### Modern Microbial ~~Energy~~ Ecology:-

Winogradsky discovered chemolithotrophy, the process by which certain microbes obtain energy from inorganic compounds.

Beijerinck identified nitrogen-fixing ~~between~~ bacteria and introduced the concept of enrichment culture.

### Microbiome Era:

The human Microbiome Project reveals the complex interplay between humans and their microbiomes.

## Types of Microbes:

### ① Bacteria:-

- Single celled prokaryotic organism with a wide range of metabolic capabilities.
- Found in nearly every habitat on Earth, including extreme environments such as hot springs and deep-sea hydrothermal vents.

### ② Archaea:

- Prokaryotes distinct from bacteria, often found in extreme environments.
- Notable for their unique biochemistry.

### ③ Viruses:

- Infectious agents that replicate only inside the living cells of other organisms.
- Can infect all forms of life, from bacteria to plants and animals.
- Play crucial roles in regulating microbial population and horizontal gene transfer.

### ④ Fungi:

- Eukaryotic organisms that include yeasts, molds and mushrooms.
- Decomposers that break down organic matter, playing a key role in nutrient cycling.
- Some fungi form symbiotic relationships with plants, while others are pathogens.

### ⑤ Protists:

- A diverse group of eukaryotic microorganisms including amoebas, algae and protozoa.
- Often found in aquatic environments, where they play roles as primary producers, predators and decomposers.

## Importance:

1. Eco System Function - Carbon cycling, N fixation, decomposition
2. Human Health - digestion, immune function, protection against pathogens
3. Bio technology - fermentation, bioremediation, production of antibiotics, enzymes and bio fuels