# Microbiology

Microbiology**:** is the study of microorganisms and their activities. It is concerned with their form, structure ,reproduction , physiology , metabolism and identification , the distribution in nature their relationship each other and with other living organisms .

**Living cells characteristics :**

All biological system ( all living cells) have the following

**1.** The ability to reproduce .

**2.** The ability to ingest food substances and metabolize the for energy and growth.

**3.** The ability to excrete waste product .

**4.** The ability to react to changes in their environment .

**5.** Susceptibility to mutation .

## Distribution of microorganisms in nature

Microorganism occur near every where in nature are carried by air currents from the earths surface to the upper atmosphere they are found in the lacks; they are found on the surface of our bodies, in all our tissues and in our mouth , nose , and other body opening .

## Medical Microbiology

Is the study of micro-organism that play a role in human infection by causing disease and pathogenic effect include ( bacteria , viruses, protozoa ) .The microbiology is divided into many branches on base of application of micro-organism .

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**1.**Air microbiology .

**2.** Milk and food microbiology

**3.** Soil microbiology .

**4.** space microbiology.

**5.** coal and petroleum microbiology.

**6.** microbiology of water and sewage .

**7.** microbiology of insects .

**8.** medical microbiology.

**The microscopic Observation of microorganisms**

Microscope is the most characteristic instrument of microbiology laboratory, provides the magnification which an able one to see organisms and structure invisible to the naked eye. microscope are available which permit a wide range of magnifications from a few hundred times to hundred thousand of times .

Protista: the kingdom of micro-organism is divided into:-

**A.** Higher protista : cell are Eukaryotic .example : algae , fungi , protozoa
**B.** Lower protista-cell are prokaryotic . example : Bacteria , blue- green algae and viruses .

**Prokaryotic cell structure**

1. primitive nucleus (no nuclear membrane) .

2. Nuclear division less complex than mitosis .

3. contain peptidoglycan can in cell wall .

4. Gene organization less defined than Eukaryotic .

**Group of protista**

1. **Bacteria** : unicellular microscope organism .

2. **Viruses** : very small , filter passing obligate intracellular parasite . pathogen for human , Animal , plant . visible and study by electron-microscope.

3. **Fungi** : Eukaryotic , multicellular molds

Unicellular

4. **protozoa**: A single cell classify on the base of morphological , nutritional and physiological characteristics . cause disease for human and animals .

| BASIS FOR COMPARISON | PROKARYOTIC CELLS | EUKARYOTIC CELLS |
|---|---|---|
| Size | 0.5-3um | 2-100um |
| Kind of Cell | Single-cell | Multicellular |

| BASIS FOR COMPARISON | PROKARYOTIC CELLS | EUKARYOTIC CELLS |
|---|---|---|
| Cell Wall | Cell wall present, comprise of peptidoglycan or mucopeptide (polysaccharide). | Usually cell wall absent, if present (plant cells and fungus), comprises of cellulose (polysaccharide). |
| Presence of Nucleus | Well-defined nucleus is absent, rather 'nucleoid' is present which is an open region containing DNA. | A well-defined nucleus is present enclosed within nuclear memebrane. |
| Shape of DNA | Circular, double-stranded DNA. | Linear, double-stranded DNA. |
| Mitochondria | Absent | Present |
| Ribosome | 70S | 80S |
| Golgi Apparatus | Absent | Present |
| Endoplasmic Reticulum | Absent | Present |
| Mode of Reproduction | Asexual | Most commonly sexual |
| Cell Divison | Binary Fission, (conjugation, transformation, transduction) | Mitosis |
| Lysosomes and Peroxisomes | Absent | Present |
| Chloroplast | (Absent) scattered in the cytoplasm. | Present in plants, algae. |

| BASIS FOR COMPARISON | PROKARYOTIC CELLS | EUKARYOTIC CELLS |
|---|---|---|
| Transcription and Translation | Occurs together. | Transcription occurs in nucleus and translation in cytosol. |
| Organelles | Organelles are not membrane bound, if present any. | Organelles are membrane bound and are specific in function. |
| Replication | Single origin of replication. | Multiple origins of replication. |
| Number of Chromosomes | Only one (not true called as a plasmid). | More than one. |
| Examples | Archaea, Bacteria. | Plants and Animals. |