**WHAT IS MICROBIOLOGY?**

**Definition:**

Study of **LIVINGS** which exist as single cell or cluster of cells and can be viewed by an aid like microscope.

Living mean: The things having characters like

* Metabolism
* Differentiation
* Reproduction
* Growth
* Communication
* Evolution and
* Adaptationetc

Cell mean: The things having

* Cell membrane
* Genetic Material
* Cytoplasm and
* Macromolecules like protein, carbohydrates, lipids etc

Unicellular mean : Single cell with independent existence, No need of other cells to carry out cellular and life functions

Examples of microorganisms : Bacteria, Archae, Fungi (Yeast and Mold), Protozoans, Alagae, and Viruses

**Branches of Microbiology:**

1. Bacteriology : Study of Bacteria
2. Mycology : Study of fungi
3. Parasitology : Study of protozoan and worms
4. Epidemiology : Study of source and prevalence of diseases
5. Immunology : Study of immune system
6. Virology : Study of viruses
7. Genetic Engineering/Biotechnology/Recombinant DNA Technology

**Importance/Role of Microorganisms and Microbiology**

**Harmful Aspects**:

* + Cause Diseases
  + Food spoilage
  + Bio-films clog water pipes and protection to microbes

**Useful Aspects**:

* Microbes as food
* Microbes for the production of foods and food additives/ingredients (organic acids, amino acids, carbohydrates, vitamins, enzymes etc)
* Disease control (antibiotics, probiotics)
* Genetic engineering (to produce desired products)
* Waste management and pollution control
* Sewerage water treatment
* Recycling of vital elements (convert C, N, S, P etc into useable form)
* Bioremediation (the use of either naturally occurring or deliberately introduced microorganisms to consume and break down environmental pollutants, in order to clean a polluted site.
* Insect Pest Control etc

**BACTERIA**

* Single celled organisms
* Prokaryote
* Need a microscope to see
* Can be found on most materials and surfaces
* Growth in number (division by fission) not in size
* Three basic shapes
  + Round shaped called cocci
  + Rod shaped called bacilli
  + Spiral shaped : rod shaped with one or more twists; never straight
  + Further classified into many groups on the basis or arrangement of the cells

**Cocci**

* + Cocci/Monococci : Single round shaped cell
  + Diplo-cocci : Pair of two round shaped cells (divide in single plane)
  + Streptococci : Chain of round shaped cells (divide in single plane)
  + Tetrads : Group of four round shaped cells (divide in two planes)
  + Sarcinae : Group of eight round shaped cells (divide in three planes)
  + Staphylococci : Cluster of round shaped cells (divide in multi planes)

**Bacilli**

* + Bacilli : Single rod shaped cell
  + Diplo-bacilli : Pair of two rod shaped cells (divide in single plane)
  + Streptobacilli : Chain of rod shaped cells (divide in single plane)
  + Coccobacilli/Oval Shaped : Single oval shaped bacteria

**Spiral**

* + Vibrio : Single curved rods
  + Spirochetes : Rod cells having helical shapelike acorkscrew

The shape of a bacterium is determined by heredity.Genetically, most bacteria are **Monomorphic**; that is, theymaintain a single shape. However, a number of environmentalconditions can alter that shape. If the shape is altered, identificationbecomes difficult. Moreover, some bacteriaare genetically **Pleomorphic**; which means they canhave many shapes, not just one.