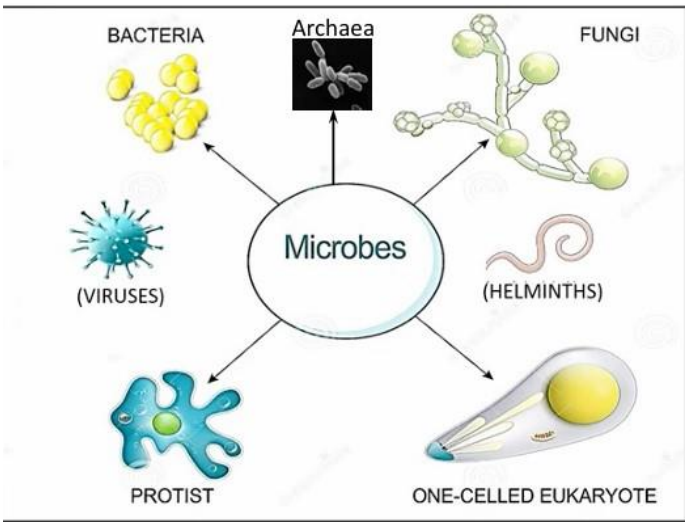
Introduction to Microbiology

Microbiology is study of microorganisms and their effects. Microorganisms or microbes, a huge diverse group of generally minute (too small to be seen by naked eye) simple life-forms includes; bacteria, archaea, fungi, algae, protozoa, and viruses.



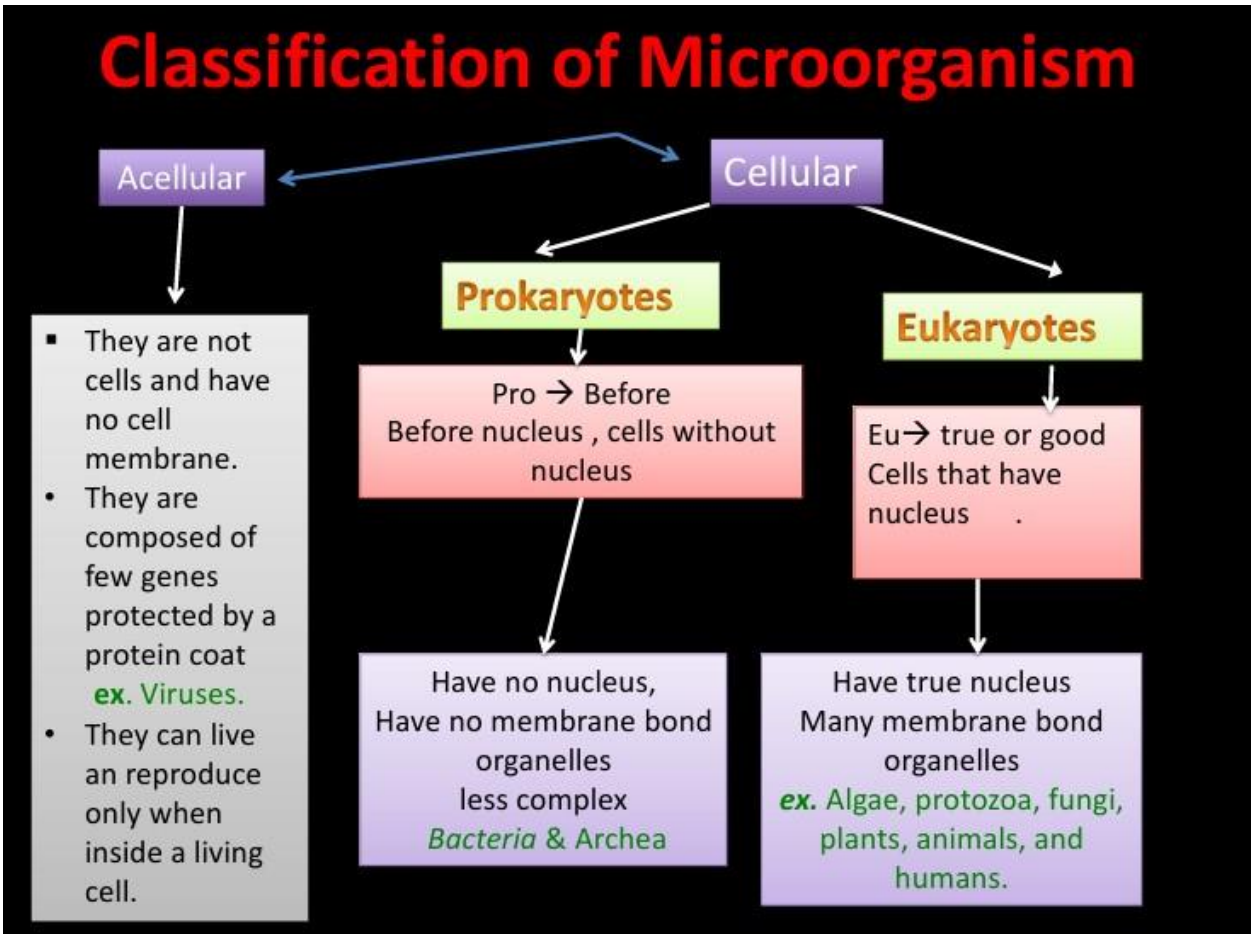
• The field is concerned with the structure, function, and classification of such organisms and with ways of both exploiting and controlling their activities.

• This field study includes basic microbial research, research on infectious diseases, study of prevention and treatment of disease, environmental functions of microorganisms, and industrial use of microorganisms for commercial, agricultural, and medical purposes.

Microorganisms are either unicellular, multicellular or acellular living organisms. And are either Eukaryotes or Prokaryotes.

•-Eukaryotes; whose cells have a nucleus and organelles (e.g. mitochondria) enclosed within membranes, may also be multicellular and include organisms consisting of many cell type forming different kinds of tissue.

•-Prokaryotes is a unicellular that lacks nucleus, mitochondria , or any other organelle. All the intracellular components (proteins , DNA located together in the cytoplasm enclosed by the cell and metabolites) are membrane, rather than in separate cellular compartments.

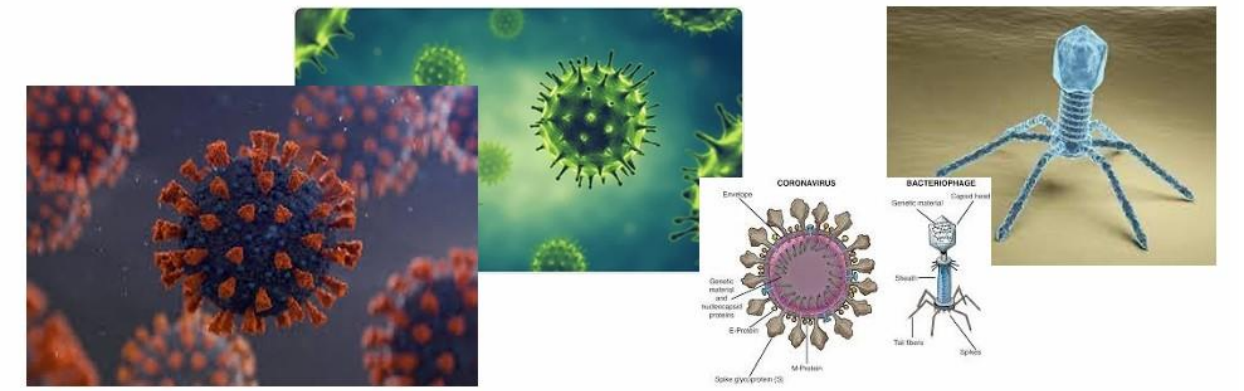


• Viruses are acellular microorganisms metabolically inert and therefor replicate only within living cells. They are included in microbiology because of their small size, their close relationship with cells, and their involvement in numerous infectious diseases.

•Most microorganisms are measured in micrometers, with two exceptions.

•The helminths are measured in millimeters, and

• the viruses are measured in nanometers.



BACTERIA (bacterium):

• Bacteria are microscopic single-celled prokaryotic microorganisms that thrive in diverse environments. Typically a few micrometers in length, bacteria have a number of shapes , ranging from spheres to rods and spirals. Bacteria inhabit soil, water, acidic hot springs, radioactive waste, and the deep portions of Earth's crust. Bacteria also live in symbiotic and parasitic relationships with plants and animals.

• There are typically 40 million bacterial cells in a gram of soil and a million bacterial cells in a milliliter of fresh water.

• Bacteria are vital in recycling nutrients, with many of the stages in nutrient cycles such as the fixation of nitrogen from the atmosphere and putrefaction.

• There are approximately ten times as many bacterial cells in the human flora as there are human cells in the body, with the largest number of the human flora being in the gut flora, and a large number on the skin. The vast majority of the bacteria in the body are rendered harmless by the protective effects of the immune system, and some are beneficial.

• However, several species of bacteria are pathogenic and cause infectious diseases, like

• cholera (*Vibrio cholerae*),
• syphilis(*Treponema pallidum*),
• anthrax(*Bacillus anthracis*)
• leprosy *(Mycobacterium leprae*)
• plague(*Yersinia pestis*) ,

• The most common fatal bacterial diseases are respiratory infections, with tuberculosis (*Mycobacterium tuberculosis*) alone killing about 2 million people a year ,mostly in Africa.

- The term **microbiology** was introduced by a french Chemist **Louis Pasteur**, who demonstrated that fermentation was caused by the growth of bacteria and yeast. He is known as **father of microbiology**.
- These microorganism cannot be seen by naked eyes, they are only seen under the microscope.
- Microorganisms are present everywhere on earth, including human beings, animals, plants, soil, water, food and atmosphere.
- Microorganisms may be beneficial or harmful to human beings.