



PLANT PATHOLOGY

Basic Terms

Culture: A population of microorganisms.

Pure Culture: A culture that consists of a single kind of microorganisms in an environment free of other living organisms

Colonies: Distinct, compact masses of cells that are macroscopically visible.

Culture medium: A mixture of nutrients used in the laboratory to support the growth and multiplication of microorganisms

Major characteristics of microorganisms

Morphological characteristics:

- Cell shape, size, and structure; cell arrangement; occurrences of special structures and developmental forms; staining reactions and motility and flagellar arrangement.
- Requires pure culture for study.
- Different types of microscopy can be employed for such characterization. Electron microscopy can help to see fine details of cell structure.

Chemical characteristics:

- The various constituents of microbial cells contain a wide variety of organic compounds.
- Microorganisms have a characteristic chemical composition with both quantitative and qualitative differences.
- Eg- occurrence of lipopolysaccharide in the cell wall of gram-negative bacteria. The basic distinction among viruses is made depending on the basis of the kind of nucleic acid they possess, namely, DNA or RNA.

Major characteristics of microorganisms

Cultural characteristics:

- Nutritional requirements and physical conditions required for growth and the manner in which growth occurs.
- Different types of culture medium: Culture containing inorganic compounds or organic compounds (amino acids, sugar, vitamins, etc). Complex substances like peptone, blood cells, or serum) may also be needed.
- Some microorganisms require living host cells for growth. E.g.- rickettsias need a culture of mammalian tissues to grow.
- Incubation temperature is also very important. Some bacteria require more than 40°C while others grow below 20°C. Human pathogenic bacteria grow at body temperature, 37°C.
- Presence or absence of oxygen and/or light also play important roles. E.g.- cyanobacteria use light as a source of energy to grow

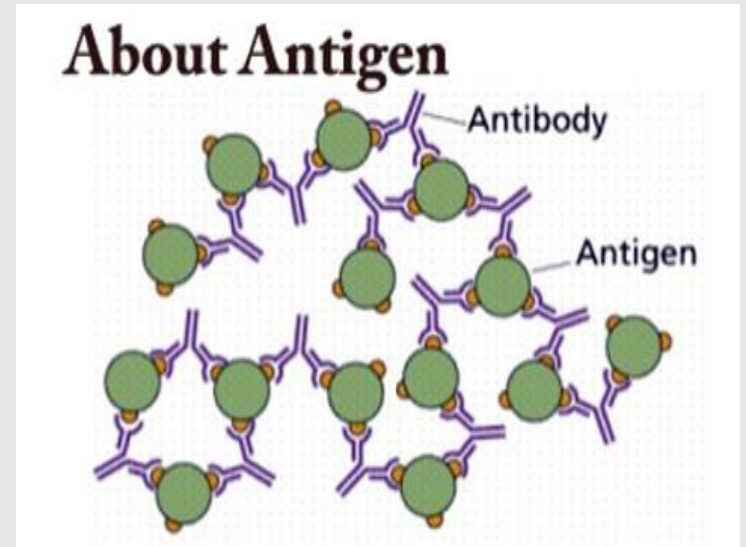
Major characteristics of microorganisms

Metabolic characteristics:

- The process of metabolism of different microorganisms offer opportunities to characterize and differentiate many microorganisms.
- Some bacteria obtain energy by absorbing light while others oxidize inorganic or organic compounds.
- Microorganisms differ in ways in which they synthesize cell components during growth.
- The enzymes produced by different microorganisms may also vary significantly.

Antigenic characteristics:

- Microbial cells contain specific antigens.
- Specific antibodies bind to specific antigens.
- Antibodies can therefore be used as tools for the identification of specific microorganisms.
- Lock and key mechanism. E.g.- typhoid bacterium.



Major characteristics of microorganisms

Genetic characteristics:

- DNA of microorganisms contain constant and characteristic features that can help in their characterization. These are DNA Base composition and the sequence of nucleotide bases in the DNA.
- The presence of plasmid DNA along with chromosomal DNA can add special characteristics to the cells containing them such as the ability to make toxins or to become resistant to antibiotics or to use unusual chemicals as nutrients



Major characteristics of microorganisms

Pathogenicity:

- The ability to cause disease is characteristic of microorganisms.
- Microorganisms can be pathogenic for animals, plants, or plants and some can cause disease to other microorganisms too. E.g- viruses called bacteriophages can infect and destroy other bacterial cells.

Ecological characteristics:

- Habitat is an important parameter for characterization.
- Marine microorganisms are different than those living in a freshwater environment.
- Microorganisms in the oral cavity are different from those of the intestinal tract

Binomial Nomenclature

- Use Binary Names - Binary names (invented by Linnaeus), consisting of a generic name and a species epithet (e.g., *Escherichia coli*), must be used for all microorganisms. Names of categories at or above the genus level may be used alone, but species and subspecies names (species names) may not. In other words, never use a species name alone.
- When to Capitalize The genus name (and above) is always capitalized, the species name is never capitalized, e.g. *Bacillus anthracis*
- When to Italicize - Names of all genus and species are printed in italics and should be underlined if handwritten (*Bacillus anthracis*); strain designations and numbers are not. If all the surrounding text is italic, then the binary name would be non-italic (Roman typeface) or underlined (e.g. A common cause of diarrhea is *E. coli*, a gram negative bacillus).