ASSIGNMENT FUNDAMENTAL OF MICROBIOLOGY

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INTRODUCTION TO MICROBIOLOGY

Microbiology is the study of microscopic organisms (microbes), which are defined as any living organism that is either a single cell (unicellular), a cell cluster, or has no cells at all (acellular). This includes eukaryotes, such as fungi and protists, and prokaryotes. Viruses and prions, though not strictly classed as living organisms, are also studied.

Microbiology typically includes the study of the immune system, or immunology. Generally, immune systems interact with pathogenic microbes; these two disciplines often intersect which is why many colleges offer a paired degree such as "Microbiology and Immunology. "

Microbiologist: A microbiology officer aboard a US naval ship examines wound cultures in the ship's microbiology laboratory.

Microbiology is a broad term which includes virology, mycology, parasitology, bacteriology, immunology, and other branches. A microbiologist is a specialist in microbiology and these related topics. Microbiological procedures usually must be aseptic and use a variety of tools such as light microscopes with a combination of stains and dyes. As microbes are absolutely required for most facets of human life (including the air we breathe and the food we eat) and are potential causes of many human diseases, microbiology is paramount for human society.

Research in the microbiology field is expanding, and in the coming years, we should see the demand for microbiologists in the workforce increase. It is estimated that only about one percent of the microorganisms present in a given environmental sample are culturable and the number of bacterial cells and species on Earth is still not possible to be determined. Recent estimates indicate that this number might be extremely high at five to the power of thirty. Although microbes were directly observed over three hundred years ago, the precise determination, quantitation, and description of its functions is far from complete, given the overwhelming diversity detected by genetic and culture-independent means.

Applied Microbiology

The information gained by microbiologists can be applied to many medicinal and commercial endeavors.

Microbiology is the study of microbes, which affect almost every aspect of life on the earth. In addition, there are huge commercial and medicinal benefits in understanding microbes. The application of this understanding is known as applied microbiology. There are many different types of applied microbiology which can be briefly defined as follows:

Medical Microbiology

Medical microbiology is the study of the pathogenic microbes and the role of microbes in human illness. This includes the study of microbial pathogenesis and epidemiology and is related to the study of disease pathology and immunology.

Pharmaceutical Microbiology

The study of microorganisms that are related to the production of antibiotics, enzymes, vitamins, vaccines, and other pharmaceutical products. Pharmaceutical microbiology also studies the causes of pharmaceutical contamination and spoil.

Industrial Microbiology

The exploitation of microbes for use in industrial processes. Examples include industrial fermentation and waste-water treatment. Closely linked to the biotechnology industry. This field also includes brewing, an important application of microbiology.

Microbial Biotechnology

The manipulation of microorganisms at the genetic and molecular level to generate useful products.

Food Microbiology and Dairy Microbiology

The study of microorganisms causing food spoilage and food-borne illness. Microorganisms can produce foods, for example by fermentation.

Applied microbiology – Fermentation: One of the oldest and well-known examples of applied microbiology is fermentation. In this picture the large tanks are being used for the fermentation of grapes to make wine.

Agricultural Microbiology

The study of agriculturally relevant microorganisms. This field can be further classified into the following subfields:

- Plant microbiology and plant pathology – The study of the interactions between microorganisms and plants and plant pathogens.
- Soil microbiology – The study of those microorganisms that are found in soil.
- Veterinary microbiology – The study of the role in microbes in veterinary medicine or animal taxonomy.
- Environmental microbiology – The study of the function and diversity of microbes in their natural environments. This involves the characterization of key bacterial habitats such as the rhizosphere and phyllosphere, soil and groundwater ecosystems, open oceans or extreme environments (extremophiles). This field includes other branches of microbiology such as: microbial ecology (microbially-mediated nutrient cycling), geomicrobiology, (microbial diversity), water microbiology (the study of those microorganisms that are found in water), aeromicrobiology (the study of airborne microorganisms) and epidemiology (the study of the incidence, spread, and control of disease).

This is by no means an exhaustive list of the different types of applied microbiology, but gives an indication of the expansive variety of the field and some of the benefits these studies entail.