

120BM0014REPORT ON LABORATORY SAFETY AND INTRODUCTION TO MICROBIOLOGY.Introduction to Microbiology :-

- Microbiology :- It is study of different microscopic organisms such as bacteria, viruses, fungi and protozoa. These organisms are beneficial to us.
- They are divided into virus, bacteria, fungi depending upon their characteristics.
- In bacteria; gram positive or gram negative strain is used to identify them.
- Virus can be categorized depending on their genome DNA or RNA whether it is single stranded or double stranded.
- In fungi, they are either divided into moulds which are multicellular or yeast which are unicellular.
- There is a hierarchy of classification where each organism including us put into different category. So, from highest to lowest it is like - Domain > Kingdom > Phylum > (Class) Order > Family > Genus > Species.
- There are 3 domains on this planet i.e. Bacteria, Archaea and Eukarya.

- Eukarya has four kingdoms namely Protista, Fungi, Plants & Animals.
- The nomenclature of bacteria are as follows:
 - It is composed of two words.
 - The first word refers to genus and the second word refers to species.
- There are different shapes of bacteria are present such as round shaped, rod shaped, vibrio or comma shaped, spirochete etc.
- Bacteria have a genetic material, cell wall and cell membrane, cytoplasm, flagella for locomotion, pill for attachment with surfaces, glycocalyx for protection, plasmid which is an extra chromosomal DNA etc.
- Biofilm is an unorganized loose structure that helps in attachment.
- Porins are the ~~transmembrane~~ transmembrane proteins that selectively allows some molecules to pass the cytosol.
- Mesosomes are equivalent to mitochondria in eukaryotes and it helps in cellular respiration. These are formed by invagination of a plasma membrane.
- In gram staining, the bacteria are classified into either Gram-positive or Gram-negative depending upon their cell wall composition and ability to retain the stain.

→ Gram positive bacteria have thick cell wall made up of many compacted peptidoglycan layers whereas gram negative bacteria have a thin cell wall made up of few peptidoglycan layers.

→ The lipopolysaccharide layer is made up of 3 structures →
O-antigen, core polysaccharide, lipid (endotoxin)

→ Endotoxins are present only in Gram negative bacteria. These are antigenic which means they can elicit an immune response causing symptoms of fever, weakness, aches or shock to the patient. etc.

→ Introduction to Microbiology Lab:

- Specimen Processing -

→ Microorganisms are too small in size, so we can't see them in naked eyes. We can visualize them in 2 ways.

* Microscopically, using a 1000X magnification.

* Growing them in different cultures.

→ Bacteria don't grow in size: they grow exponentially by number over a period of 6-8 hours.

→ There are 4 criteria for growing the bacteria.

* Nutritional requirement of the bacteria.

* Time requirement for growth.

* Temperature Requirement.

→ Culture specimens :

- * Agar is used to satisfy the nutritional requirement of bacteria.
- * We can take the swab, inoculate the agar, rolling the swab to get all bacteria of it.

→ Types of Agar Plates :

A whole variety of agar plates of different colours are present such as white, black, pink, yellow, green, orange etc. Mannitol use salt to make agar plate selective.

→ Time requirement for growth.

Most of the bacteria grow in 24 hrs, anaerobic bacteria took 48 hrs for their growth which have slow growth rate, we will keep culture up to 96 hrs to 4 days to ensure proper growth of bacteria.

→ Environmental Conditions.

- * Most of bacteria requires normal temperature i.e. $35^{\circ}\text{C} - 37^{\circ}\text{C}$. Yeasts are grown at 3°C .

→ Lab Safety Orientation :-

→ Prior to the Lab :

- * Dress appropriately and don't wear any open-toed slipwear.
- * Avoid clothing baggy sleeves.
- * Take a moment to learn the operation.

→ During the Lab :- Always wear a lab coat, gloves and safety goggles while working in the lab.

- * Wash the hands prior to beginning of the lab and just before leaving.
 - * Tie back any long hair because it is both source of contamination and fire hazard.
- Disposal of contaminated materials.
- * Dispose the plastic, petri-dishes, swabs, disposable gloves, inoculating tools, and similar non-disposable items in the bio-hazard container.
 - * Used microscopic slides should be placed in a container for autoclaving or soaked in disinfectant solution for min 30 mins.
 - * Do not overfill the container and never force objects into the container.
- Safety Consideration:
- * Discard the broken glass in proper container.
 - * In case of ^{exposure} ~~exposure~~ of skin to microorganisms, immediately wash with anti-septic.
 - * After 15-20 minutes, carefully wipe up the spill and discard the paper towels in biohazard container for autoclaving.