[Shishir Khanal - 120BM0939]

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REPORT 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. Most of these organisms are beneficial to us.
- Generally these organisms are divided into bacteria, virus, fungi according to their characteristics
- In bacteria, Gram strain i.e either positive or negative are used to categorize them.
- Virus can be categorized depending on their genomic DNA or RNA, whether it is single stranded or double stranded.
- In fungi, they are either divided into molds 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

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- Eukarya has four kingdoms namely Protista, fungi, Plants and Animals
- The nomenclature of bacteria are as follows:-
  - It 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 memberane, cytoplasm, flagella for locomotion, pilli 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.
- Porions are the transmemberance proteins that selectively allows some molecules to pass the cytosol
- Mesosomes are equivalent to mitrochondria in eukaryots and it helps in cellular respiration. These are formed by invagination of a plasma memberane.
- In gram straining, the bacteria are classified into either Gram positive or gram negative depending on their cell wall composition and ability to retain the stain.

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- 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 lipo-polysachride layer is made up of 3 structures → O-angtigene, core polysaccharide, lipid (endotoxin).

- Endotoxins are present only in Gram negative bacteria, These are antigenic which means they can elicit an immune response causing symptons of fever, weakness, aches or shock to the patient, e.t.c.

- Introduction to Microbiology lab:

- Specimen Processing:

- Microorganism are too small in size, so we can't see them in naked eyes. We can visulize them in 2 ways:

i) Microscopically, using a 1000 X magnification.

ii) 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.

i) Nutritional requirement of the bacteria

ii) Time requirement for growth

iii) Temperature requirement

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- 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 e.t.c. 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.

- Enviornmental condition:

- Most of bacteria requires normal temperature i.e 35-37°C. Yeasts are grown in 3°C.

- Lab safety Orientation:

Prior to the lab:

Dress appropriately and don't wear any open-toed slipwears.

Avoid clotting bagging sleeves

Take a moment to learn their operation

During the lab:

Always wear a lab coat, gloves and safety goggles while working in lab.

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- Wash the hands prior to begining 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-reusable items in the biohazard 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 exposion of skin to microorganisms, immediately wash with antiseptic
- After 15-20 minutes, carefully wipe up the spill and discard the paper towels in biohazard containers for autoclaving.

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