Lecture-2

Glimpses of Microbial World

1. **Discuss the difference between Gram positive and Gram negative cell wall of the bacteria**

Answer: Gram-positive cell walls consist of many layers of peptidoglycan and do not posses a lipid outer membrane. Gram-negative cell walls on the other hand have only one or a few layers of peptidoglycan but posses an outer membrane consisting of various lipid complexes.

2. **Why are prokaryotic cells usually smaller than eukaryotic cells?**

Answer: Eukaryotes are packed with organelles and much more cellular machinery. They are typically characterized by the presense of a prominent, more or less central nucleus. Prokaryotes can reproduce and metabolize, the structures and processes they possess to do such functions are often rudimentary and less effective than those of a eukaryotic cell.

3. **Discuss about the different flagellar assembly found in bacteria? Differentiate between pili and flagella structure.**

Answer: Different species of bacteria have different numbers and arrangements of flagella. Monotrichous bacteria have a single flagellum (e.g., *Vibrio cholerae*). Lophotrichous bacteria have multiple flagella located at the same spot on the bacteria's surfaces which act in concert to drive the bacteria in a single direction. Amphitrichous bacteria have a single flagellum on each of two opposite ends (only one flagellum operates at a time, allowing the bacteria to reverse course rapidly by

switching which flagellum is active). Peritrichous bacteria have flagella projecting in all directions (e.g., *E. coli*).

Fimbriae are specialized for attachment of bacteria to its host as in case of pathogenic bacteria *salmonella typhimurium , Nisseria gonorrhoea , bordella pertussis.*

Whereas pili are responsible for sexduction (conjugation) in bacteria, and serves as receptors for certain viruses.

4. Differentiate between the genetic materials found in bacteria and eukaryotic cells?

Answer: Prokaryotic genetic material is organized in a simple circular DNA molecule (the bacterial chromosome) in the nucleoid region of the cytoplasm. Eukaryotic genetic material is divided into different, linear molecules called chromosomes inside a discrete nucleus, usually with additional genetic material in some organelles like mitochondria and chloroplasts.

5. Distinguish between capsule, slime layer and cell wall found in bacteria?

Answer: The bacterial cell wall provides structural integrity to the cell. In prokaryotes, the primary function of the cell wall is to protect the cell from internal turgor pressure caused by the much higher concentrations of proteins and other molecules inside the cell compared to its external environment. Many bacteria secrete extracellular polymers outside of their cell walls. These polymers are usually composed of polysaccharides and sometimes protein. Capsules are relatively

impermeable structures that cannot be stained with dyes such as India ink. They are structures that help protect bacteria from phagocytosis and desiccation. Slime layer is involved in attachment of bacteria to other cells or inanimate surfaces to form biofilms. Slime layers can also be used as a food reserve for the cell.