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Assignment:

1. Discuss microbial variation and hereditary in bacteria

2. Explain Microbial recombination Answers:

1. Genetic information in bacteria and many viruses is encoded in DNA, but some viruses use RNA. Replication of the genome is essential for inheritance of genetically determined traits. Gene expression usually involves transcription of DNA into messenger RNA and translation of mRNA into protein.

Genome Organization

The bacterial chromosome is a circular molecule of DNA that functions as a self-replicating genetic element (replicon). Extrachromosomal genetic elements such as plasmids and bacteriophages are nonessential replicons which often determine resistance to antimicrobial agents, production of virulence factors, or other functions. The chromosome replicates semiconservatively; each DNA strand serves as template for synthesis of its complementary strand.

Mutation and Selection

The complete set of genetic determinants of an organism constitutes its genotype, and the observable characteristics constitute its phenotype. Mutations are heritable changes in genotype that can occur spontaneously or be induced by chemical or physical treatments. Organisms selected as reference strains are called wild type, and their progeny with mutations are called mutants.

2. Bacterial recombination is a type of genetic recombination in bacteria characterized by DNA transfer from one organism called donor to another organism as recipient. This process occurs in three main ways:

\* Transformation, the uptake of exogenous DNA from the surrounding environment.

\* Transduction, the virus-mediated transfer of DNA between bacteria.

\* Conjugation, the transfer of DNA from one bacterium to another via cell-to-cell contact.

The final result of conjugation, transduction, and/or transformation is the production of genetic recombinants, individuals that carry not only the genes they inherited from their parent cells but also the genes introduced to their genomes by conjugation, transduction, and/or transformation. The ability to undergo natural transformation is present in at least 67 bacterial species. Natural transformation is common among pathogenic bacterial species.