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Assignment

1. Discuss microbial variation and hereditary in bacteria
2. Explain microbial recombination

1

Any change in the genotype of a bacterium or its phenotype is known as **variation**. Genotypic **variation** can occur as a result of changes in the genes by way of mutation, loss or acquisition of new genetic elements. ... Phenotypic **variations** are seen temporarily when bacteria are grown under certain environmental conditions. microbial genetics one can distinguish three major natural strategies in the spontaneous generation of genetic variations in bacteria. These strategies are: (1) small local changes in the nucleotide sequence of the genome, (2) intragenomic reshuffling of segments of genomic sequences and (3) the acquisition of DNA sequences from another organism. The three general strategies differ in the quality of their contribution to microbial evolution. Besides a number of non-genetic factors, various specific gene products are involved in the generation of genetic variation and in the modulation of the frequency of genetic variation. The underlying genes are called evolution genes. They act for the benefit of the biological evolution of populations as opposed to the action of housekeeping genes and accessory genes which are for the benefit of individuals. Examples of evolution genes acting as variation generators are found in the transposition of mobile genetic elements and in so-called site-specific recombination systems.

**Heritable variations:**  
**Mutation:** A gene will mutate spontaneously, about once in a hundred million cell divisions. Such bacteria are called mutants. Most of these mutants die, but a when a mutant can adapt itself to the environment more readily; it may emerge as a new variant. Chromosomal mutations may lead to Emergence of drug resistance in bacteria

**Transformation:** Some bacteria have ability to uptake naked DNA fragment from the surrounding environment. When such a DNA confers new property to the bacterium, it is termed transformation. Change from R form of *Streptococcus pneumoniae* to S form as demonstrated by Griffith is due to transformation.

**Conjugation:** Transfer of genetic material (usually plasmids) from one bacterium to another through the mediation of sex pili is known as conjugation. Any property that is coded on a transmissible plasmid can be transferred to a recipient bacterium. Properties such drug resistance mediated by beta-lactamases, bacteriocin production etc can be transferred by conjugation

**2**

**Bacterial recombination** is a type of [genetic recombination](https://en.m.wikipedia.org/wiki/Genetic_recombination) in [bacteria](https://en.m.wikipedia.org/wiki/Bacteria) characterized by [DNA](https://en.m.wikipedia.org/wiki/DNA) transfer from one organism called donor to another organism as recipient. This process occurs in three main ways:

* [Transformation](https://en.m.wikipedia.org/wiki/Transformation_(genetics)), the uptake of exogenous DNA from the surrounding environment.
* [Transduction](https://en.m.wikipedia.org/wiki/Transduction_(genetics)), the virus-mediated transfer of DNA between bacteria.
* [Conjugation](https://en.m.wikipedia.org/wiki/Bacterial_conjugation), the transfer of DNA from one bacterium to another via cell-to-cell contact.