OPEN ACCESS Freely available online

Journal of Bacteriology & Parasitology

ISSN: 2155-9597

Commentary

A Brief Note on Genetic Recombination in Bacteria

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DESCRIPTION

Bacterial recombination is a form of genetic recombination that occurs in bacteria. The exchange of DNA occurs between a donor and a receiving organism. There are three basic methods in which this happens:

• Uptake of exogenous DNA from the environment also known as transformation.

• Transduction, the transfer of DNA between bacteria which is mediated by a virus.

• Conjugation is the process of passing the DNA from one bacterium to another *via* cell-to-cell contact.

Genetic recombinants are the individuals which carry both the genes and they received from their parent cells and the genes added to their genomes *via* conjugation, transduction, and transformation as a result of conjugation, transduction and transformation. In bacteria, recombination is usually mediated by a RecA recombinase. These recombinases use homologous recombination to repair DNA damage.

At least 67 bacterial species have the ability to undergo spontaneous metamorphosis. Natural transformation is a risk for pathogenic bacterial species. In some circumstances, the bacterial pathogen's survival is aided by the DNA repair capabilities offered by recombination during transformation. Bacterial transformation is carried out by several interacting bacterial gene products.

Initially, evolution in bacteria was thought to be the product of mutation or genetic drift. Genetic exchange which is also known as gene transfer and now it is recognized as a fundamental driving mechanism in prokaryote evolution. In species like *E. coli*, this driving force has been extensively investigated. Bacteria reproduce asexually with daughter cells that are identical to their parents. Because of its clonal nature, random mutations occur during DNA replication which may help the bacteria to evolve.

It was once considered that bacteria could only evolve by accumulating mutations. Bacteria, on the other hand, import genes through a mechanism known as homologous recombination which was initially found when mosaic genes were located near antibiotic resistance loci. The discovery of homologous recombination changed the way about bacterial evolution. The adaptive value of evolution in bacterial recombination is significant. Bacterial recombination has been demonstrated to increase the transfer of multidrug resistance genes *via* homologous recombination at higher levels.

DNA is exchanged between bacteria *via* cell-to-cell communication in bacterial conjugation. Plasmids which allow DNA to be transferred from one cell to another may be used in cell-to-cell communication. The F-plasmid is absorbed by surrounding cells. During F-plasmid transfer, the recipient and donor cells come into touch. The genetic material is transported horizontally between the cells during horizontal gene transfer.

In homologous recombination, the RecBCD mechanism repairs double-strand breaks in DNA that has degraded in bacteria. The base pairs bound to DNA strands are exchanged. Branch migration is the second phase in bacterial recombination. The base pairs of homologous DNA strands are continuously interchanged. As a result two DNA duplexes are formed. When the nucleotide sequence reaches 5′-GCTGGTGG-3′, the RecBCD pathway engages in helicase activity and unzips the DNA duplex. The Chi site is the name given to this nucleotide sequence. After the nucleotide sequence reaches the Chi site, the RecBCD enzymes will alter. The RecF pathway is involved in the repair of DNA strands that have been damaged.

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Received: December 01, 2021; **Accepted**: December 15, 2021; **Published**: December 22, 2021

Citation: Walton J (2021) Genetic Recombination in Bacteria. J Bacteriol Parasitol. 12: 411.