

TRANSDUCTION

By:

Dr Arun kumar singh
Associate professor in Botany
JLN College Dehri –on sone
Gmail:-arunsinghbot85@gmail.com

For:

B.Sc. Botany(Part-III)
Microbiology
Paper-VI

Bacteria mainly reproduces by splitting via Binary fission. Sexual reproduction usually absent as meiosis is not observed in Bacteria, but gene recombination occur.

Three main processes involved in genetic recombination of bacteria. The processes are (I) Transduction (II) Transformation (III) Conjugation

(I) Transduction :Genetic material is transferred from donor to recipient cell through a non-replicating bacteriophage –temperate bacteriophage. Viruses that infect bacteria move short piece of chromosomal DNA from one bacterium to another “by accident”.

Discovered by Lederberg and Inder(1952)

Process of Transduction

- A small fragment of bacterial DNA is incorporated into an attacking bacteriophage.
- When this bacteriophage infect a new bacterial cell, it transfers the genetic material into it, and thus genetic recombination takes place.

Transduction is of two types :

(A)Specialised or Restricted Transduction

(B)Generalised Transduction

(A) Specialised or Restricted Transduction :

- Bacteriophage gets attached to a bacterial cell wall at the receptor site.
- The nucleic acid of bacteriophage is transferred into the cytoplasm of host cell.
- In the bacterial cell ,the phage nucleic acid code for synthesis of specific protein, the repressor protein.

- The repressor protein prevent the virus to produce the material require for its replication.
- In bacterial cell, the viral DNA may exist as a fragment in the cytoplasm or it may attach itself to the chromosome, known as prophage.
- The bacterial cell which carries the prophage is called lysogenic and the phenomenon where the phage DNA and bacterium exist together is called lysogeny.
- In lysogenic the viral DNA replicates together with bacterial chromosome.
- In course of time,the phage stops the synthesis of repressor protein in the bacterial cell.
- Then synthesis of phage components starts.
- Now the phage DNA separates from the bacterial chromosome and stars the synthesis of phage proteins.
- During this separation, a number of genes of the bacterium get attached to it.
- The attached genes keep on replicating along with phage DNA and later on develop into phage particle.
- Phage particle comes out from bacterial cell by bursting.
- When the new phage particle infects a new bacterial cell the attached bacterial genes enter into the chromosome of new bacteria and causes recombination.
- Then the new bacterial cell contain its own gene and several genes from the particles
This type of transduction is known as specialized transduction. It is extremely rare event.

(B) Generalised transduction :

- Here prophage particle is present in the cytoplasm of infected bacterial cell.
- Phage DNA starts synthesizing new phages.
- Chomosome of bacterial cell gets fragmented and some of fragments become attached with the DNA of some new phage particles while others remain with phage particles.
- When the newly formed phage with fragment of bacterial chromosome, its DNA attacks a new bacterium and the genes of the present bacterium is transferred to the new bacterium and causes recombination.This type is also rare.

