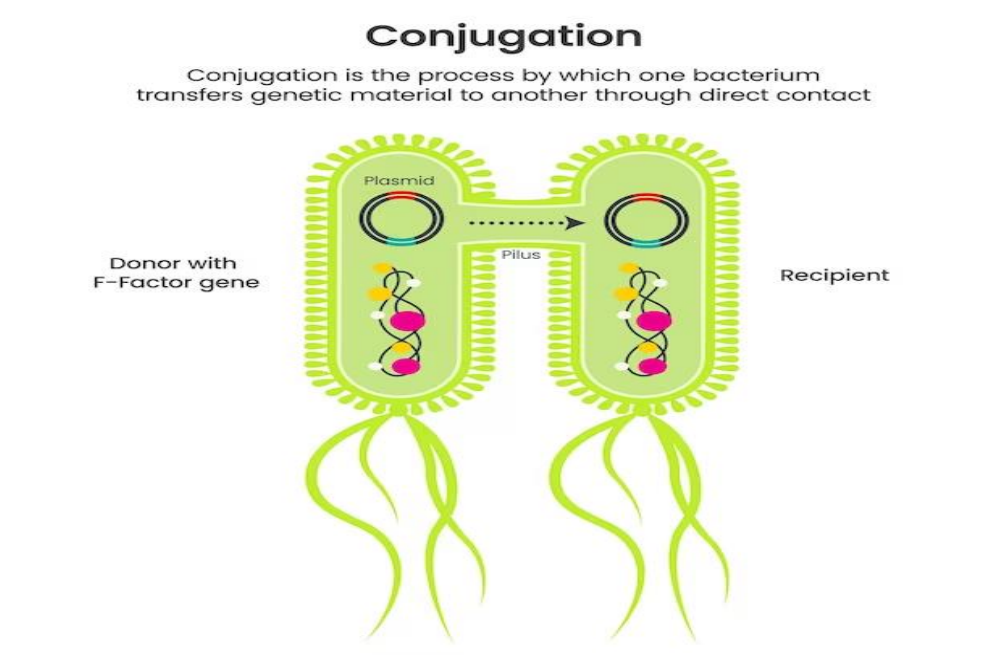
Lec 10 \ Horizontal Gene Transfer (HGT)



Horizontal Gene Transfer (HGT)

The process of transmitting genetic information in microorganisms (especially bacteria) takes place between individuals of the same strain within the same species or between individuals of different species and genera. The process of transferring genes from parents to offspring is called vertical gene transfer. However, if genes are transferred between different species and races, it is called horizontal gene transfer. This process is of great importance in the development of many organisms.

*

Horizontal gene transfer *

The process of horizontal gene transfer is the main reason behind the emergence of resistance to many antibiotics. It has also been credited with the development of some bacteria that have the ability to break down and decompose pesticides, as well as the development and transmission of many virulence factors

Vertical gene transfer *

The process of vertical gene transfer occurs naturally by binary fission of bacteria, while horizontal gene transfer requires special components

The process of information transmission occurs by one of the following processes: *

1-Conjugation الاقتران

2-Transformation التحول

3-Transduction (Bacterial Conjugation) .
الاقتران البكتيري

Bacterial Conjugation

* It is one of the most common horizontal gene transfer processes. It is defined as the transfer of genes or genetic information between bacterial species or genera through direct contact between two paired cells, one of which is called the donor, which contains the plasmid and is symbolized by F+ (called F plasmid) and the other is called The recipient does not contain a plasmid and is symbolized by F- by extending what is called the sex pilus or conjugation bridge. Conjugation Bridge.

Requirements for bacterial conjugation include: *

1- The donor bacteria, which must contain the conjugation plasmid F plasmid or F factor, as well as the sex cilia or F pilus, symbolized by F+.

2- The recipient bacteria that does not contain a conjugation plasmid or sex cilia and is symbolized by F-.

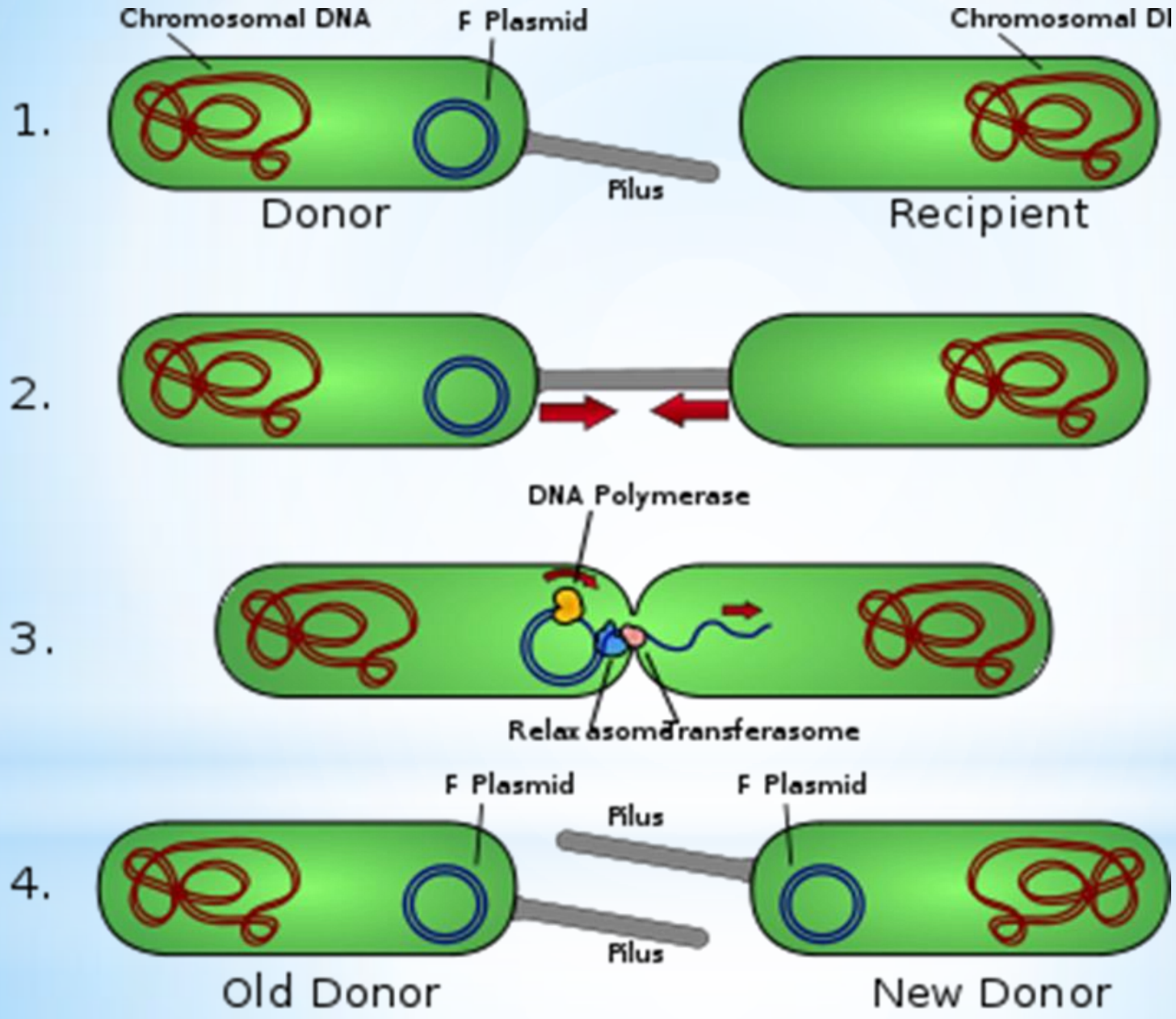
The conjugation plasmid, or so-called F plasmid or F factor, has the following specifications: *

1-It is able to insert itself into the chromosome of the donor bacteria by homologous recombination. It is called episome

2 - It has a molecular size of approximately 100 Kb

3- It is capable of self-replication and contains the OriV replication site and the OriT transition site

4-It contains the tra and trb system, which represents a group of genes (approximately 40 genes) that must be available to ensure the pairing process.


1.
Chromosomal DNA
F Plasmid
Chromosomal DI
Pilus
Donor
Recipient
2.
3.
DNA Polymerase
Relaxasome
Transferasome
4.
F Plasmid
F Plasmid
Pilus
Pilus
Old Donor
New Donor