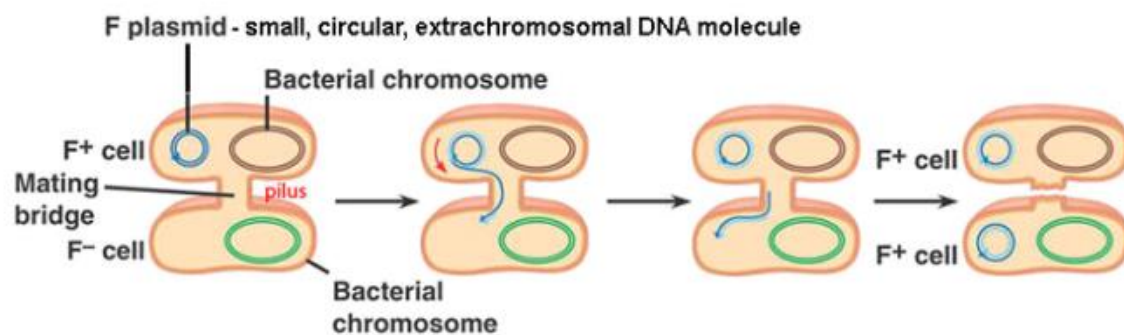


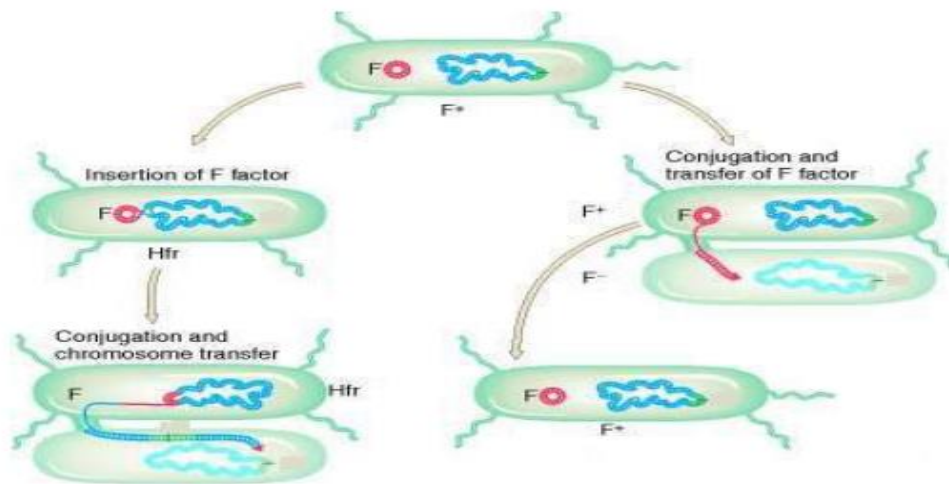
Bacterial conjugation

The transfer of DNA between bacterial cells was directional with one cell acting as the donor and the other cell acting as the recipient. It was found that the donor cells contain a fertility factor (F⁺) whereas the recipient lacks the fertility factor (F⁻). F is a small circular piece of DNA called an episome or plasmid. The F factor is about 100 kbp, It can replicate autonomously within the bacterial cell or can integrate into the host chromosome. Genes found on F encode fibrous proteins that make up minute tubules called pili. The F pili enable the F⁺ cells to attach to other cells. Once the two cells are in contact, a pore forms that allows the transfer of DNA from the (F⁺) cell to the F⁻ cell. The F⁺ cell transfers a copy of its DNA to the F⁻ cell as the DNA is being synthesized.



: Conjugation and transfer of an F plasmid from an F⁺ donor to an F⁻ recipient

When the transfer is complete, the F⁻ cell contains a copy of F and is now considered an F⁺ cell. It is also possible for the F factor to integrate into the host chromosome and thus can transfer parts of the host chromosome. In a population of cells that have the F factor in the cytoplasm, a small fraction of the cells will have F integrated into the chromosome. This strain of cells will be able to transfer host chromosomal markers at a high rate. Such strains are called Hfr for high frequency of recombination. Because the F factor integrates at a specific point on the circular bacterial chromosome, an Hfr strain will transfer genetic markers from the host in a fixed order from that point. This ordered transfer of markers has been used to map mutations and thus map gene locations on the bacterial chromosome.



High frequency recombinant cell

Bacterial conjugation procedure:

First day

1. Add 200 μ l of ampicillin resistant E.coli and 200 μ l of chloramphenicol resistant E.coli to 5 ml of nutrient broth.
2. Incubate the mating cells at 37 C° for overnight to conjugate.

Second day

1. Spread 50 μ l of the mating cells on ampicillin containing plate, chloramphenicol containing plate, and ampicillin and chloramphenicol containing plates.
2. Incubate the plates at 37 C° for overnight.