Reproduction: Reproduction by binary fission is very common. It is the method by which many bacteria multiply very rapidly explaining the cause of spoilage of food stuffs, turning of milk into curd etc.

Sexual Reproduction

Typical sexual reproduction involving the formation and fusion of gametes is absent in bacteria. However, gene recombination can occur in bacteria by three different methods. They are 1. **Conjugation** 2. **Transduction** 3. **Transformation**

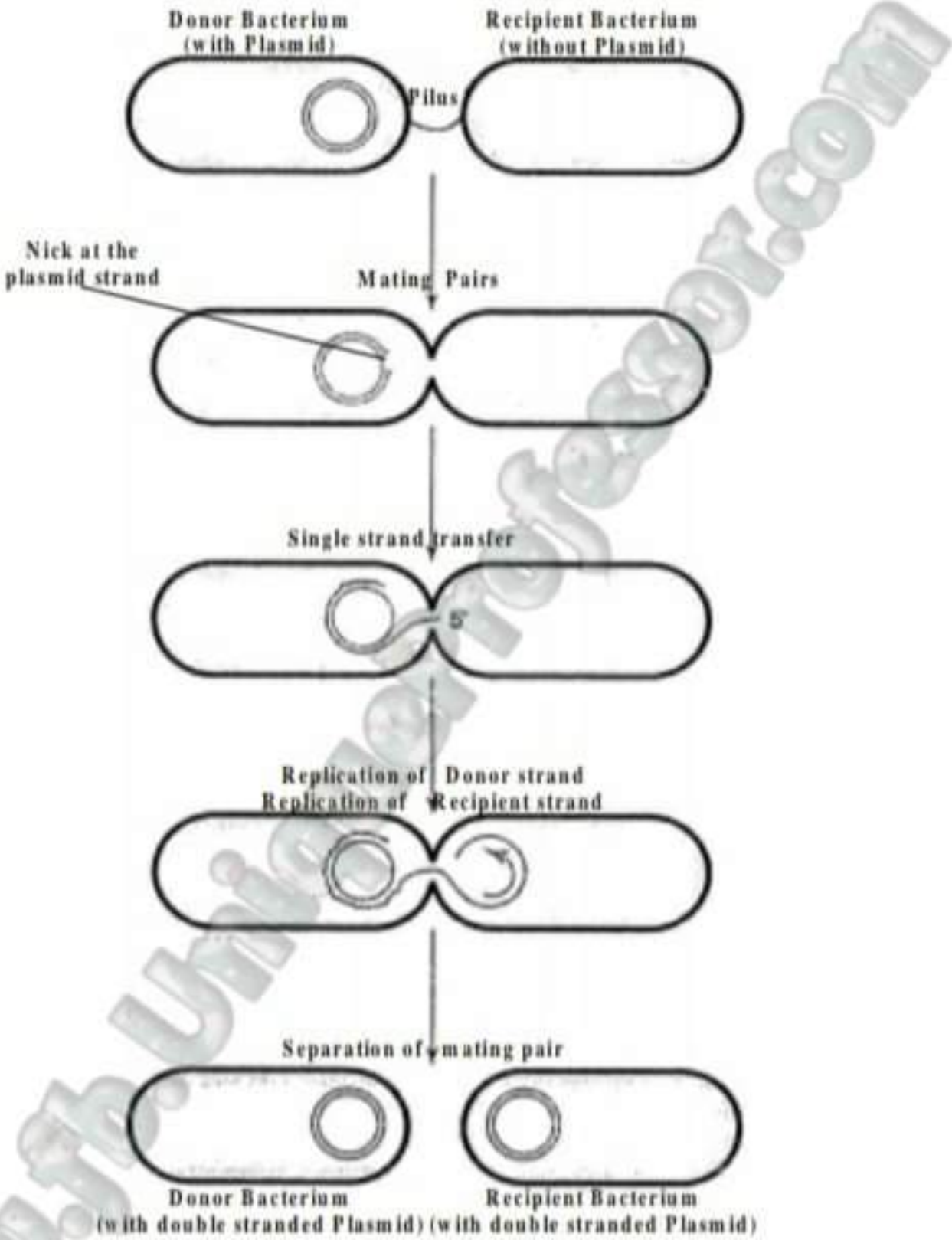

Fig: 1.9. Conjugation in Bacteria

1. **Conjugation**: In this method of gene transfer, the **donor** cell gets attached to the **recipient** cell with the help of pili. The pilus grows in size and forms the conjugation tube. The plasmid of donor cell which has the **F+** (fertility factor) undergoes replication. Only one strand of DNA is transferred to the recipient cell through conjugation tube. The recipient completes the structure of double stranded DNA by synthesizing the strand that compliments the strand acquired from the donor.

2. **Transduction** : Donor DNA is carried in a phage coat and is transferred into the recipient by the mechanism used for phage infection.

3. **Transformation** : The direct uptake of donor DNA by the recipient cell may be natural or forced. Relatively few bacterial species are naturally competent for transformation. These species assimilate donor DNA in linear form. Forced transformation is induced in the laboratory, where after treatment with high salt and temperature shock many bacteria are rendered competent for the assimilation of extra-cellular plasmids. **The capacity to force bacteria to incorporate extra-cellular plasmids by transformation is fundamental to genetic Engineering.**