Recombination refers to changes in genetic information

- **Homologous recombination** involves replacement of DNA sequence with a similar sequence
- Bacteria may also acquire additional DNA

Evidence for Bacterial Transformation
Mechanism of Bacterial Transformation

- Natural transformation is limited to particular species
- Transformation requires specialized proteins in the recipient cells for competence

Conjugation - Plasmid transfer

- Plasmids are circular DNA molecules replicated independently of the bacterial chromosome
- Plasmids encode proteins that allow for their transfer to cells without the plasmid
- Plasmid transfer is accompanied by “rolling circle” replication

Conjugation - Formation of an Hfr cell

- Recombination between the plasmid and the chromosome leads to integration of the plasmid into the chromosome
- Or is that integration of the chromosome into the plasmid?
Conjugation - Transfer of chromosomal genes

- As in Figure 8.27a, the plasmid begins rolling circle replication and transfer into the recipient
- This time, the chromosomal DNA of the Hfr is dragged along
- The transferred chromosomal DNA may undergo homologous recombination into the recipient chromosome

Generalized Transduction

- Plasmids are very common in many species of bacteria
- Plasmids may be conjugative, allowing their genes to be spread among bacteria
- Plasmids may carry genes for antibiotic resistance and toxins
Transposons - “Jumping genes”

- First described for eukaryotes by Barbara McClintock
- Simplest are *insertion sequences*
- Complex transposons have contributed to evolution of R plasmids with genes for multiple antibiotic resistances