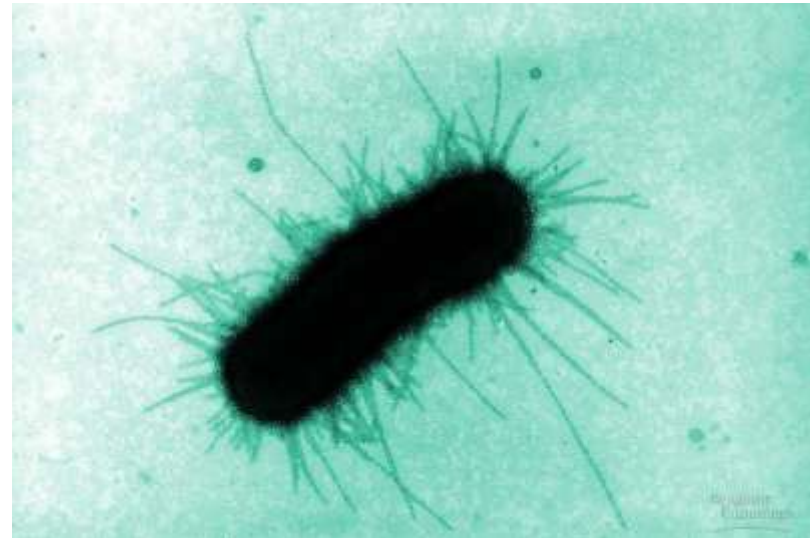


- Chapter 28
- *Prokaryotes and the Origins of Metabolic Diversity*

Structural characteristics

- **Cell wall - peptidoglycan (sugars & proteins);**
 - **Gram +**: w/peptidoglycan penicillin action
 - **Gram -**: little peptidoglycan, lipopolysaccharides; most pathogens; impede drug action
- **Capsule: adherence; protection**
- **Pili: adherence; conjugation**



Form & Function

- Nucleoid region (*genophore*: non-eukaryotic chromosome)
- Plasmids
- Asexual reproduction: binary fission (not mitosis)
- “Sexual” reproduction (not meiosis):
transformation~ uptake of genes from surrounding environment
conjugation~ direct gene transfer from 1 prokaryote to another
- Endospore: resistant cells for harsh conditions (250 million years!)



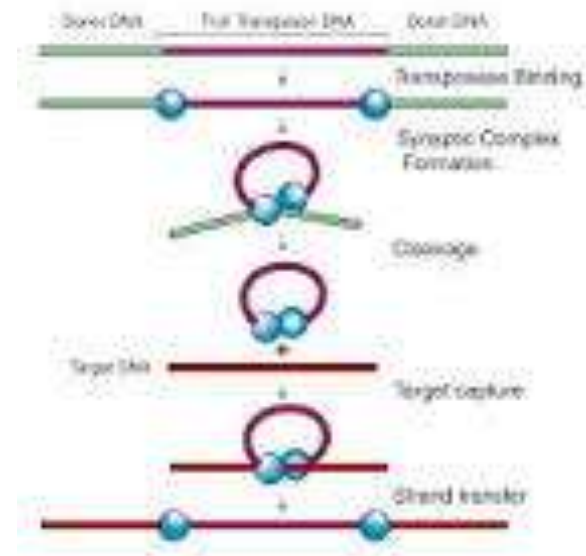
Transduction

- A virus transfers genetic material from one bacterium to another.
- Bacteriophages are able to infect bacterial cells and use them as hosts to make more viruses.
- After multiplying, these viruses assemble and occasionally remove a portion of the host cell's bacterial DNA.
- Later, when one of these bacteriophages infects a new host cell, this piece of bacterial DNA may be incorporated into the genome of the new host.



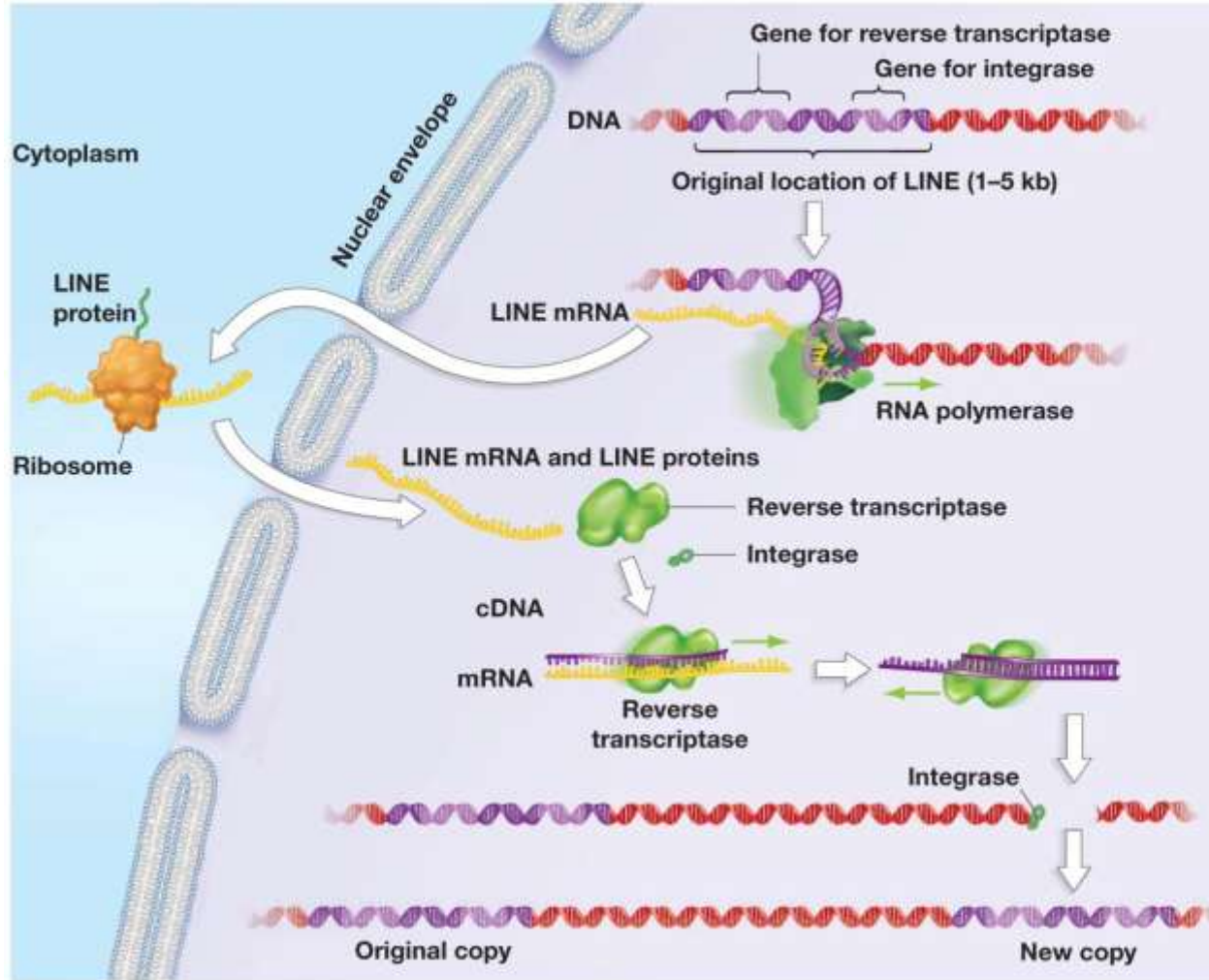
Transposons

- Jumping genes
- Portable DNA
- Increases genetic diversity
- Barbara McClintock won a Nobel prize for her work on corn in 1983



Transposons

HOW LINE TRANSPOSABLE ELEMENTS SPREAD



1. A long interspersed nuclear element (LINE) exists in DNA.

2. RNA polymerase transcribes LINE, producing LINE mRNA.

3. LINE mRNA exits nucleus and is translated.

4. LINE mRNA and proteins enter nucleus.

5. Reverse transcriptase makes LINE cDNA from mRNA, then makes cDNA double stranded.

6. Integrase cuts chromosomal DNA and inserts LINE cDNA.

7. New copy of LINE is integrated into genome.

Homeotic Genes

- Genes important in development
- Especially of body segments along the axis
- Changes in these genes can have a large impact on structure of organism

