

Chapter 5 : Bacterial Genetics

All genes → Genome

Chromosome

Additional genes

- Single circular supercoiled dsDNA
- No nuclear memb. (Nucleoid)
- Contain 4000 genes (essential for life)
- Associated at point with mesosome → separation of the 2 sister chromosomes following replication

- Plasmid
- Transposable genetic elements XXXXX
- Bacteriophage DNA XXXXX

Small extra-chromosomal circular dsDNA (1:50 of the chromosome)

Dispensable (carry genes not essential for life)

evidence *لم يشرح*

Can replicate **autonomously** (independent of the chromosome)

many copies of the same plasmid may exist in the same cell (plasmid copy number)

Relaxed plasmid
stringent plasmid
XXXXXX

spontaneous loss during cell division

Plasmid curing (kicking off plasmid by physical or chemical agents) "Heat" "ABs"

Function of plasmid (عناوين فقط)

- (1) F (fertility) conjugative plasmid → Sex pilus formation → conjugation
- (2) AB resistance Plasmid
- (3) Bacteriocin production → Bacteriocidal substance produced by certain bact. and active against other bact. of the same or closely related species
- (4) Virulence Plasmid → e.g. Colicin E (produced by E.coli)
- (5) Other Functions XXXXXXXX → Code for exotoxins, Adhesins, invasion factors
- (6) Cloning vector in recombinant DNA technology

Chapter 6 : Bacterial Variation

(change in bact. characters)

Phenotypic Variation

- Due to change in env. conditions
- Reversible (transient)
- Non-heritable
- e.g. 1- L-forms
- 2- Loss of flagella upon exposure to phenol

Genotypic Variation

- Due to change in gene constitution
- irreversible (permanent)
- Heritable
- e.g.

Mutation (جزء ملغي)

Change in nucleotide sequence

Replication error (spontaneously) → once every $10^6 - 10^7$ cells

induced by 1- radiation 2- chemicals → once every $10^3 - 10^4$ cells

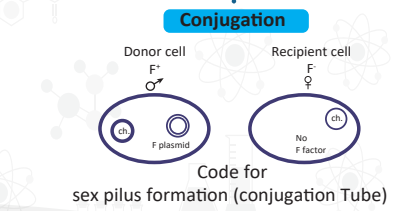
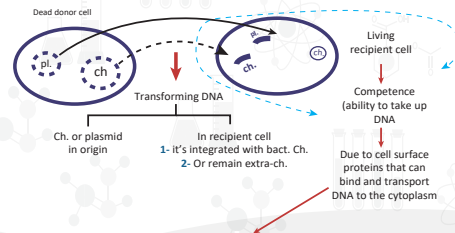
Gene Transfer

Gene Transfer from 1 bact. to another by.....

Transformation
Small DNA is taken by living recipient cell from dead donor cell

Transduction
by bacteriophage

Conjugation
by sex pilus (most frequent mechanism of gene transfer)



Artificial competence can be induced (in recombination DNA technology)

By treating recipient bact. with $CaCl_2$ → Alter cell memb. permeability → uptake of DNA

General Micro (7)