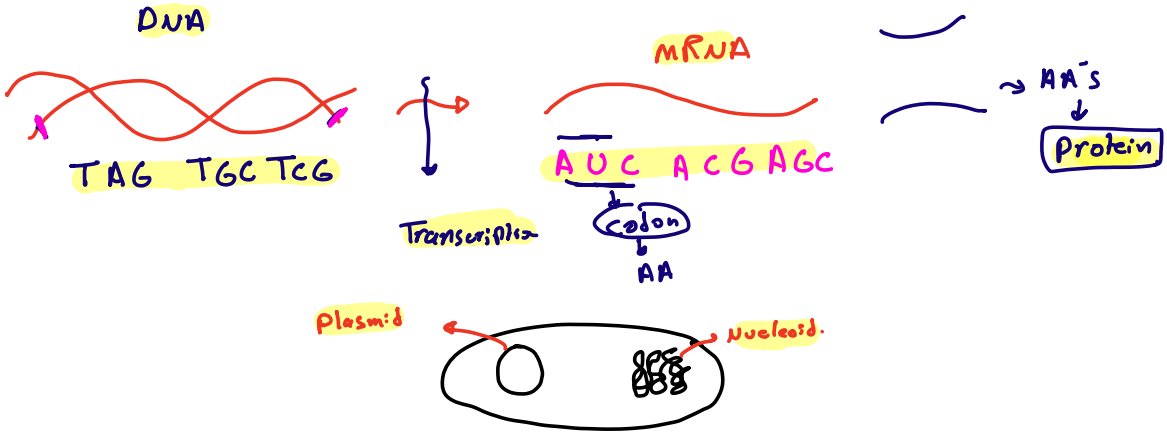
Bacterial Genetics



* Plasmid:

- Extra chromosomal, circular, Double stranded DNA
- Replicate Independently
- Carry at Least one Gene → Give trait Ex: AB resistance
  resistance to heavy metals
  virulence factors
  Metabolic Functions Etc.

Factors affecting Bacterial Genes

Mutations:

GCGATTCAC
GCGATTGCT

Natural Induced

↑↑ : Beneficial
↓↓ : Lethal / harmful
– : Silent.

Aquring of New Genes

GCGATTCAC
GCGATTCAC AAGUTA (New)

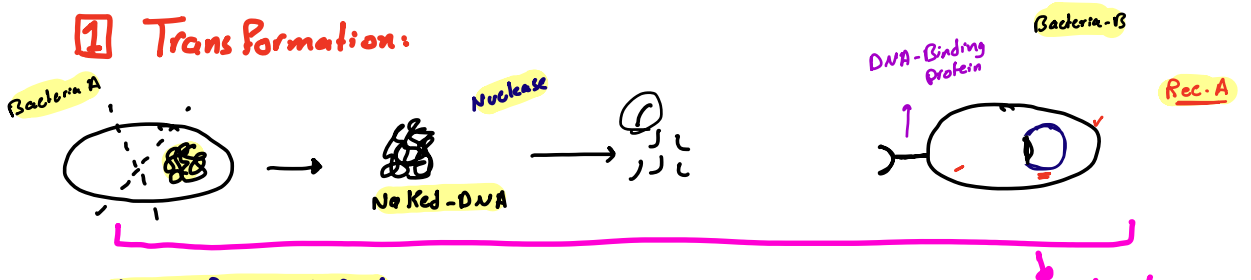
Other Bacteria

Transformation: Naked DNA ✓

Transduction: viruses

Conjugation: sex / F pilli

1 Transformation:



Natural Tranformation

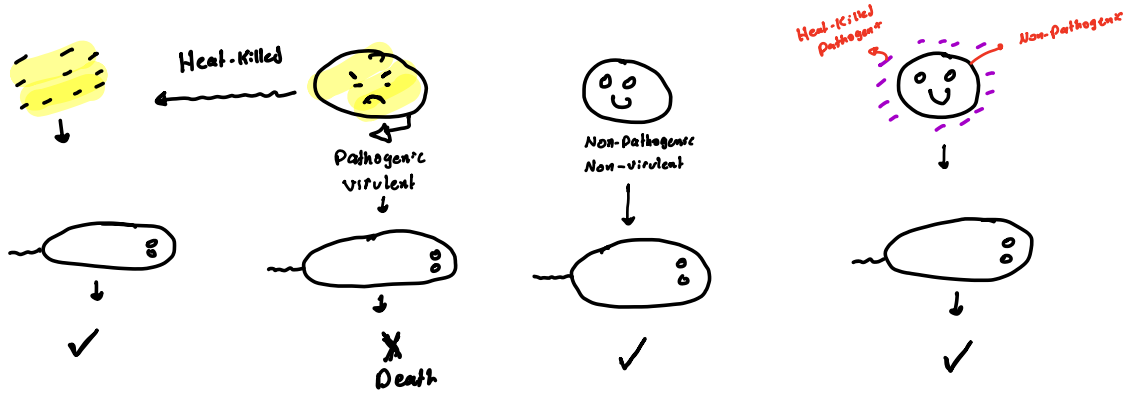
- uptake of Naked DNA

- G+ve : بتوخد single stranded DNA → synthesis complemantary DNA

G-ve : Double stranded DNA

? ↑ virulence

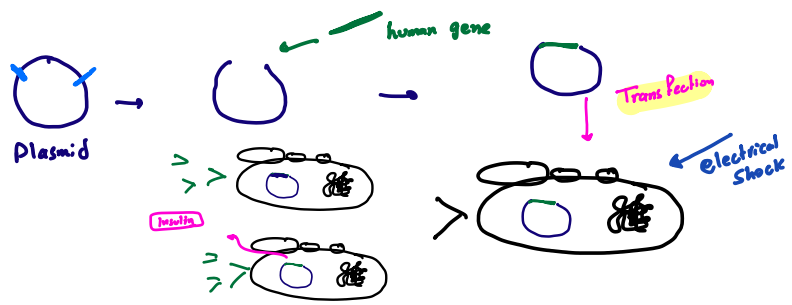
* Griffith Experiment:



Carbs	X	✓	✓	✓	✓
Lipids	✓	X	✓	✓	✓
Proteins	✓	✓	X	✓	✓
RNA	✓	✓	✓	X	✓
DNA	✓	✓	✓	✓	X
	↓	↓	↓	↓	↓
	X	X	X	X	✓

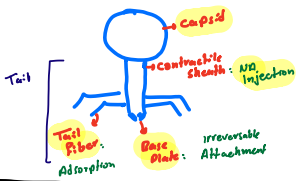
Tranforming Factor: DNA

Artifial Transformation: (Cloning):



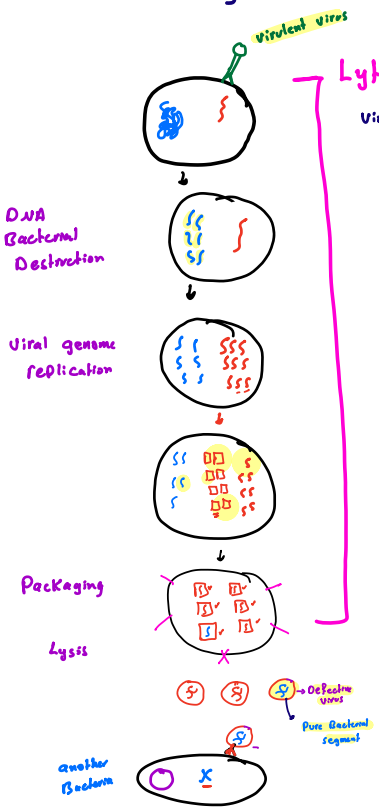
2 Transduction:

- Transfer of DNA Between Bacteria by viruses (Bacteriophage = phage)



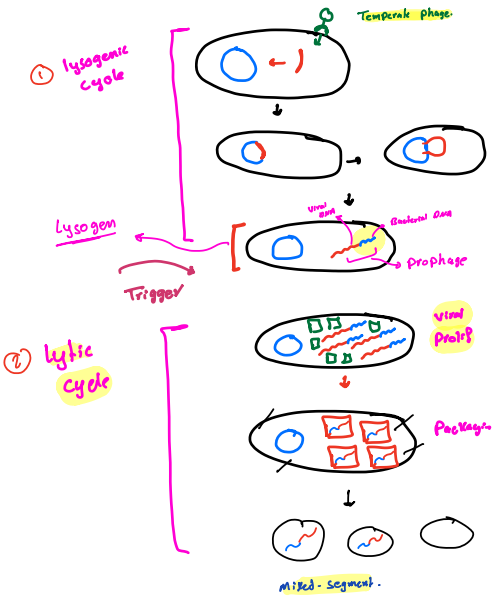
Generalized Transduction

Can Transfer any Gene



Specialized Transduction

Transfer certain Genes



Transduction

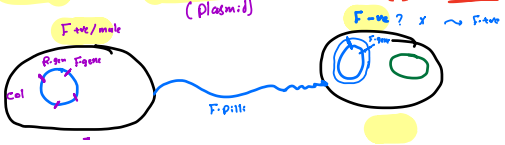
هذا الجدول: أمثلة على فيروسات تنقل جين إلى بكتيريا مما يكسبها القدرة على إفراز Toxin فتصاب بمرض

Medical Importance: transfer of new toxin encoded gene to bacteria

Bacterium (البكتيريا)	Phage (الفيروس الذي ينقل الجين)	Gene Product (الجين المنقول)	Phenotype (المرض الذي يحدث للمريض)
Vibrio cholerae	CTX phage	cholerae toxin	cholera
Streptococcus pyogenes	T12	erythrogenic toxins	scarlet fever
Corynebacterium diphtheriae	corynephage beta	diphtheria toxin	diphtheria
Escherichia coli	lambda phage	shigalike toxin	hemorrhagic diarrhea
Clostridium botulinum	clostridial phages	botulinum toxin	botulism (food poisoning)

3 Conjugation:

- Transfer of DNA element (Plasmid) by sex / conjugate / F pillus.



* Transposones / Jumping Genes:

DNA element that can Hop / Jump.