Résistance aux antibiotiques : gènes sans frontières

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Bacterial genome
Everything that exists in the universe is the result of chance and necessity

Democritus

(460-370 B.C.)
Antibiotic induced increase in mutation rate

- Sublethal antibiotic
- Stress response
- ROS
- DNA damage
- Mutations
- Recombination
- Competence
- Transformation
Transformation: internalization of exogenous DNA

Transformation: processing of internalized DNA

Exogenous DNA

Chromosome

Linear synapsis

Integration intermediate

Covalent joining

Competence for transformation is transient

The Competence Stimulating Peptide (CSP) induces competence

Induction of transformation in *S. pneumoniae*

Phrudhomme *et al*. 2006. Science
Antibiotics promote evolution of resistance

- Antibiotic
- Stress
- Competence
- Transformation
- Antibiotic resistance
- Capsule exchange
- Fratricide
Plasmid transfer by conjugation
Transfer of integrative conjugative element

Conjugation

Donor

Recipient

Integration

Excision

attL

attB

ICE

attL

attB
Antibiotic-induced ICE transfer

**Limitations in heterologous gene expression**

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<th>TTTG</th>
<th>19/23 pb</th>
<th>TAnnTTTG</th>
<th>TTTGACA</th>
<th>16/18 pb</th>
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Gene expression from strong *E. coli* promoters (*P_{tet}, P_{tac}, P_{trc}, rrnB P1P2*) does not occur in *B. fragilis*

*B. fragilis* promoters are inactive in other bacterial species (*E. coli, B. subtilis, C. perfringens*)
The End