



MEXICO UNAM-IPN



***“DESIGN OF AN EXPERIMENTAL MODEL TO DETECT
EVENTS OF HORIZONTAL GENE TRANSFER IN
Escherichia coli”***

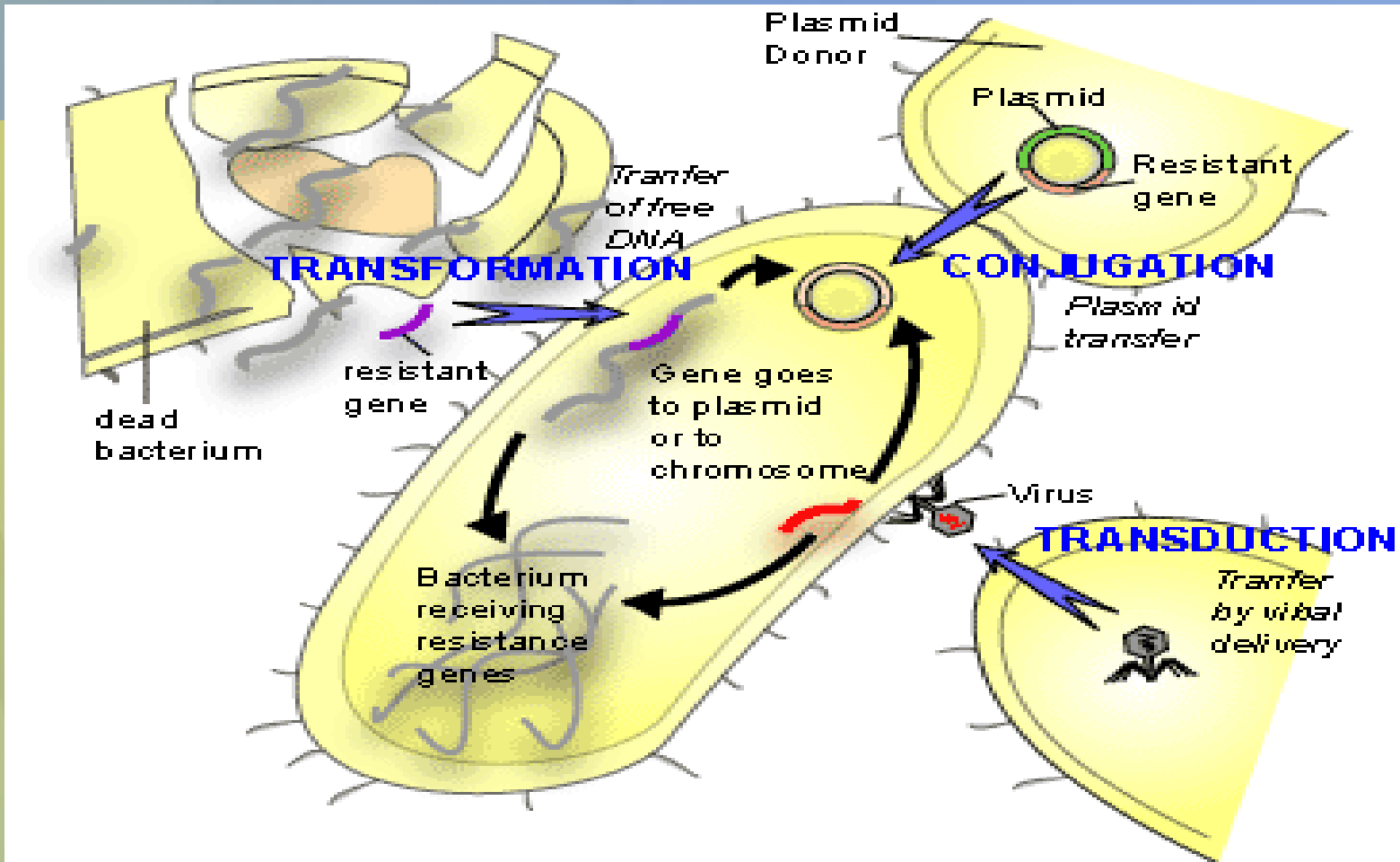
Introduction to Horizontal Gene Transfer

- What is Horizontal Gene Transfer (*HGT*)?
- The importance of this phenomenon
- The relevance of our project

What is *HGT*?

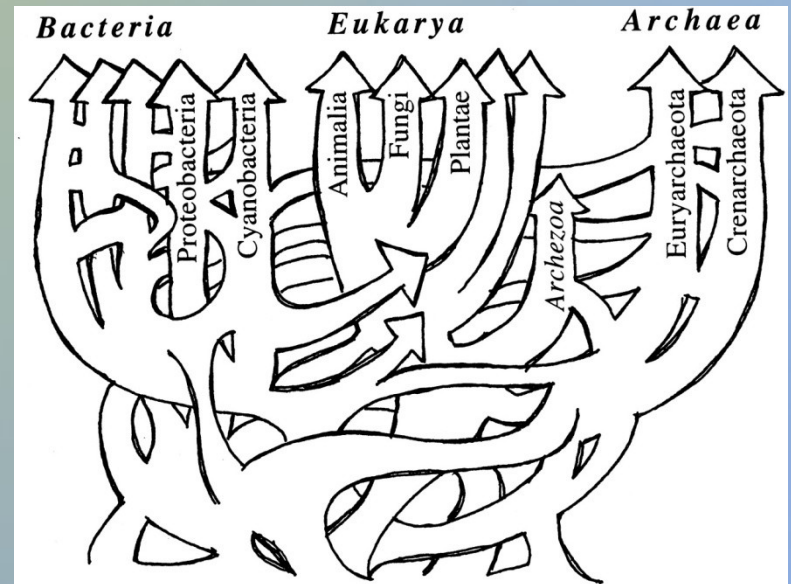
HGT is a process in which an organism incorporates genetic material from other organism without being the offspring of that organism.

HGT can occur in three ways:



The importance of this phenomenon

HGT is thought to have played a very important role in the evolution of life, especially in early stages of life



This phenomenon helps bacteria to acquire antibiotic resistance...

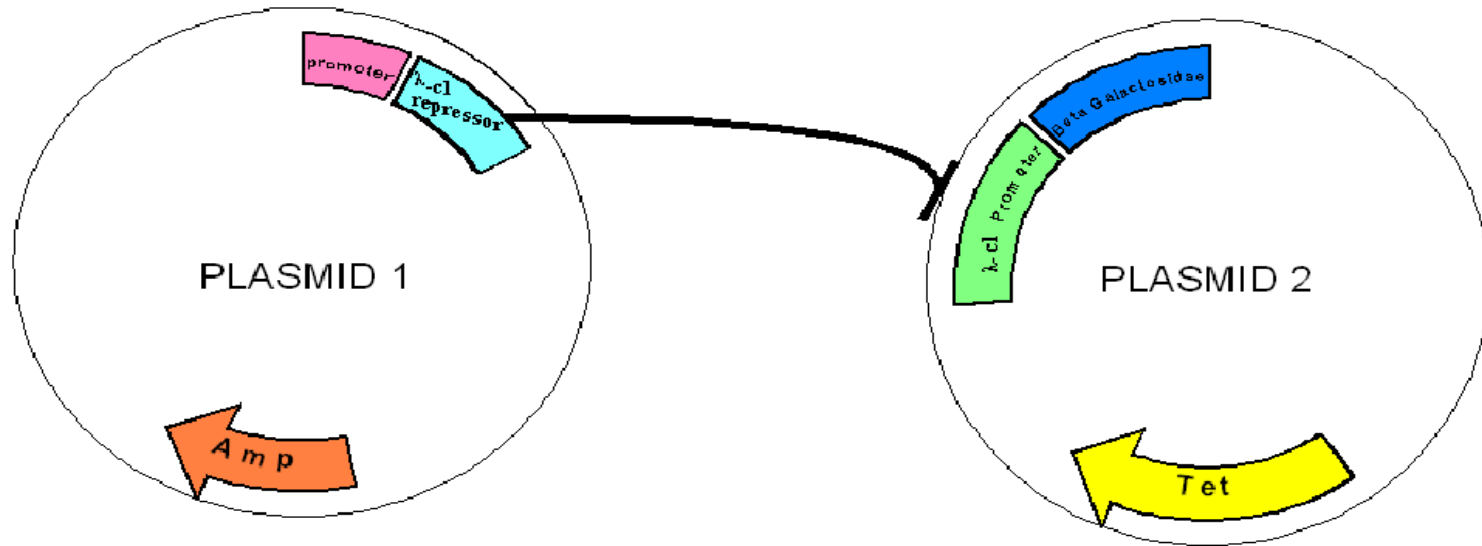


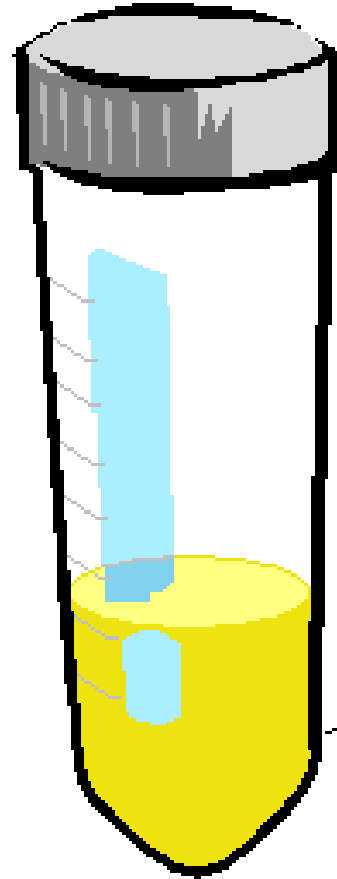
... and It might allow genetic devices to spread quickly among natural populations.

A device for detecting HGT events?

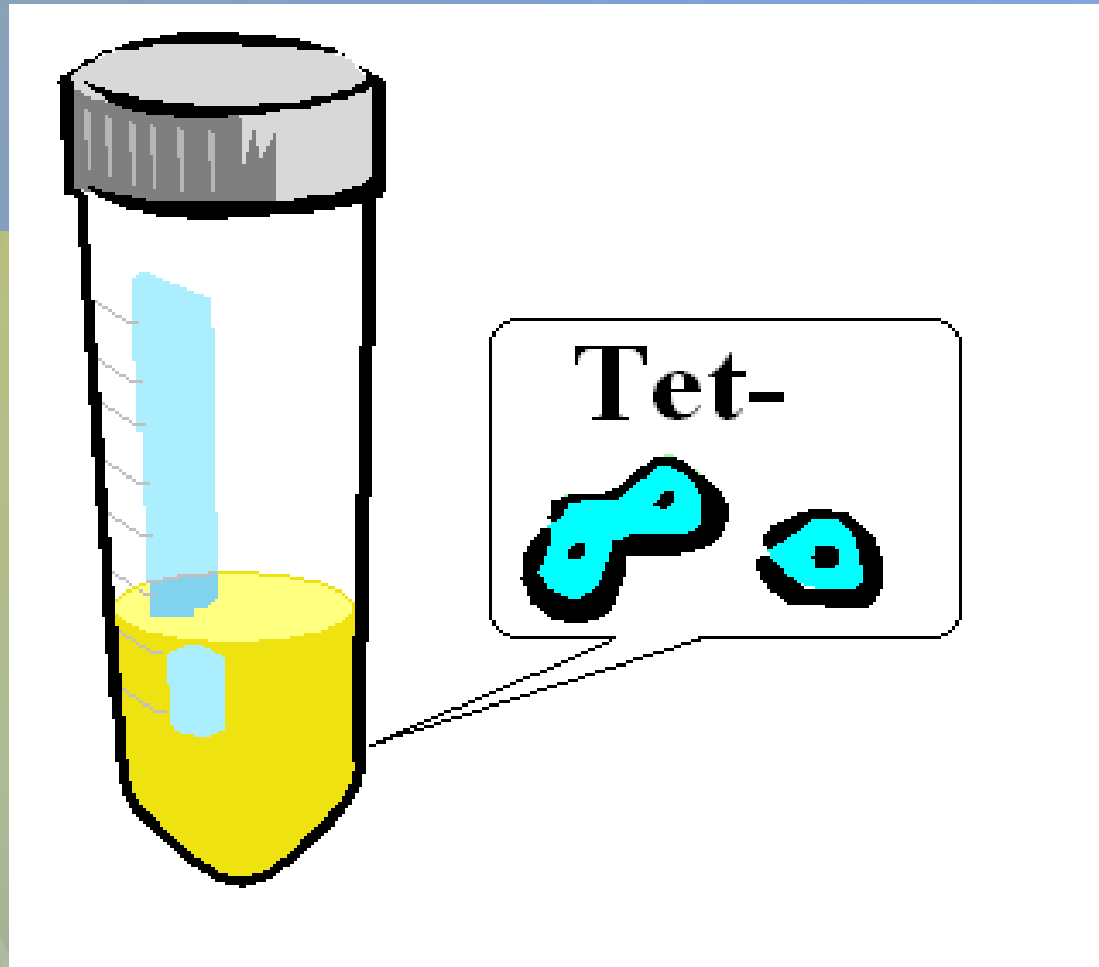
- It might help you understand better the history of life.
- It may help us control the spread of antibiotic resistance.
- It will help us to know the risks of unintentional spread of a genetic device.

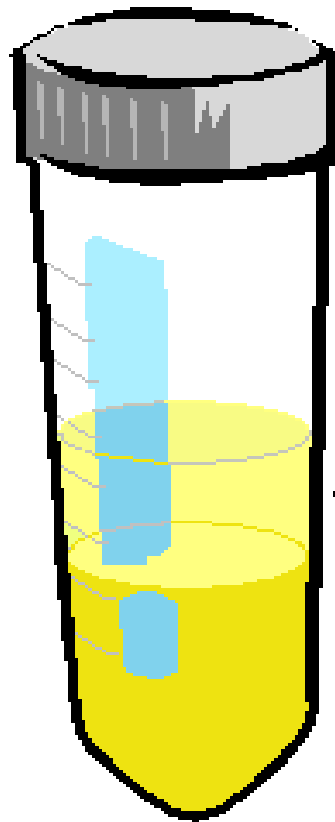
Construction





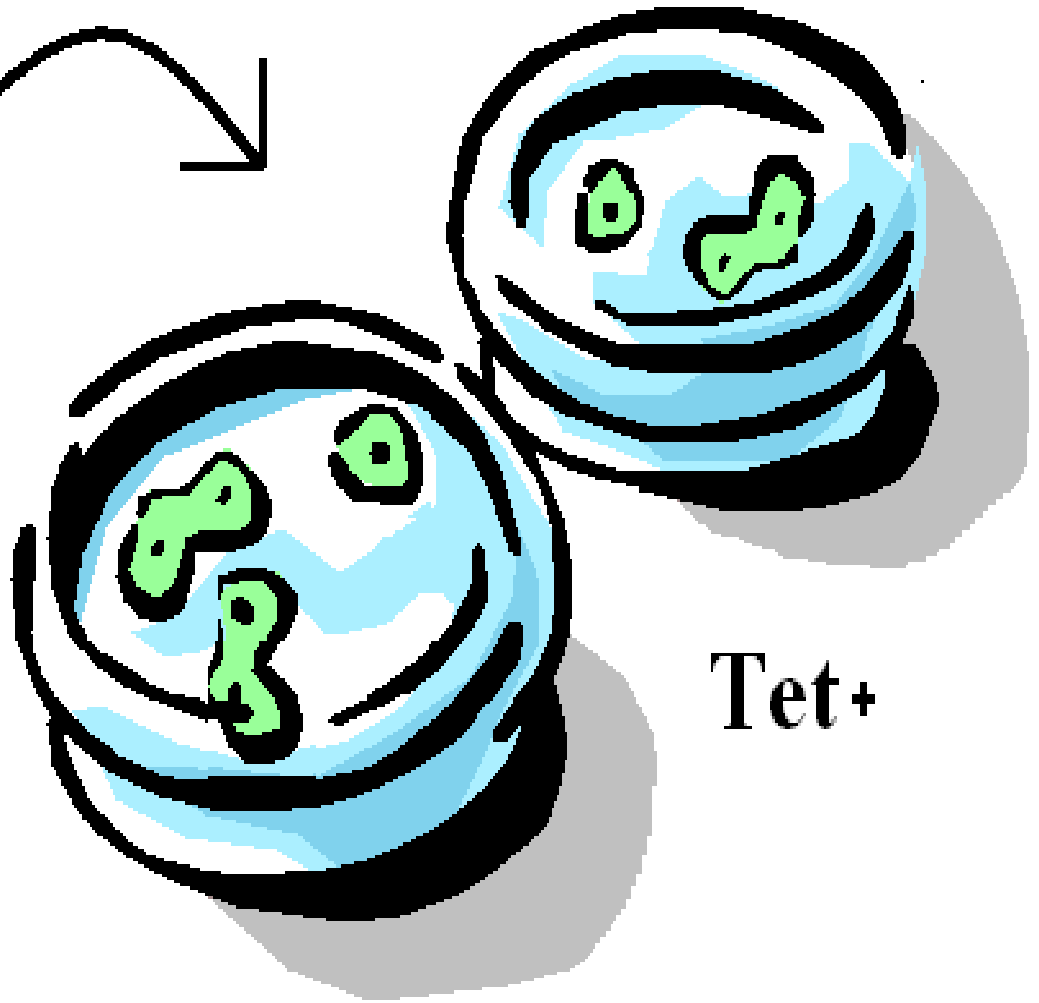
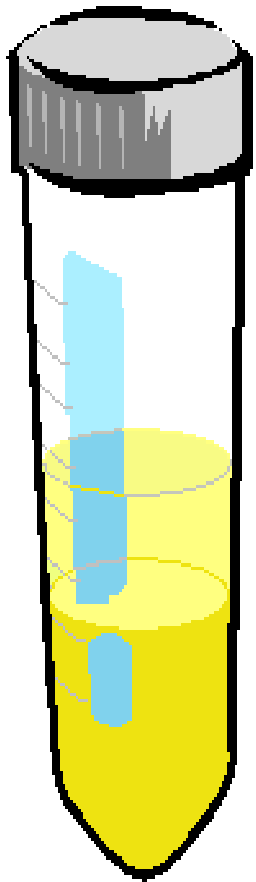
Tet
antibiotic





Tet+





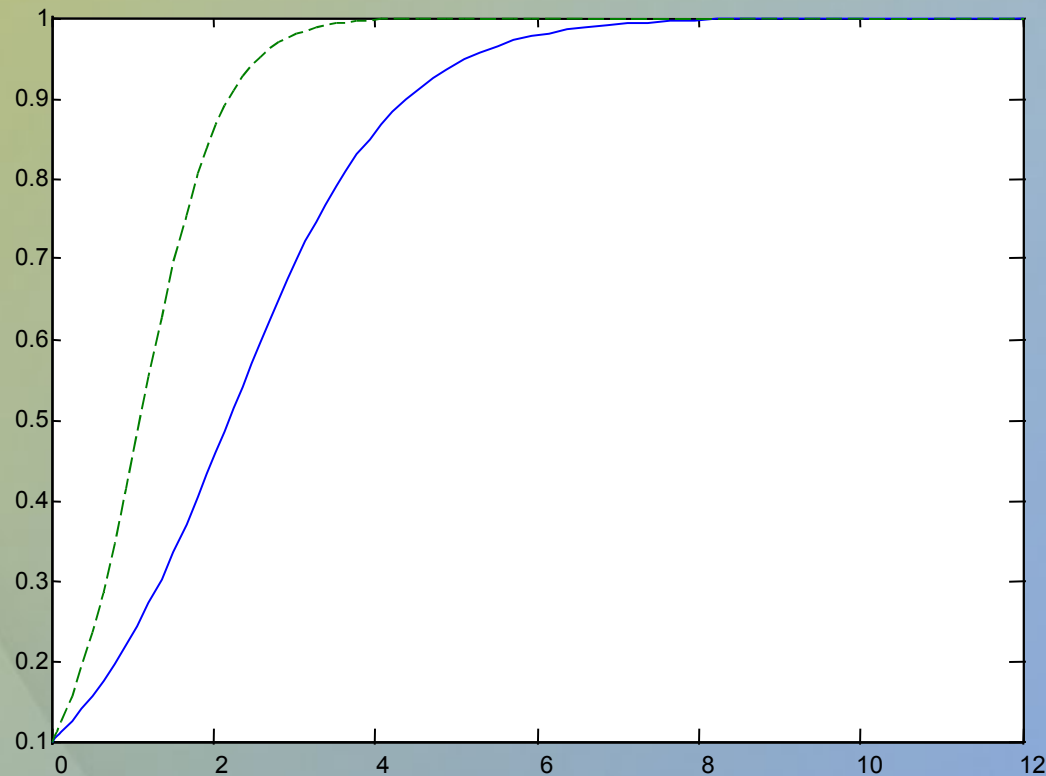
Tet+

Mathematical modelling

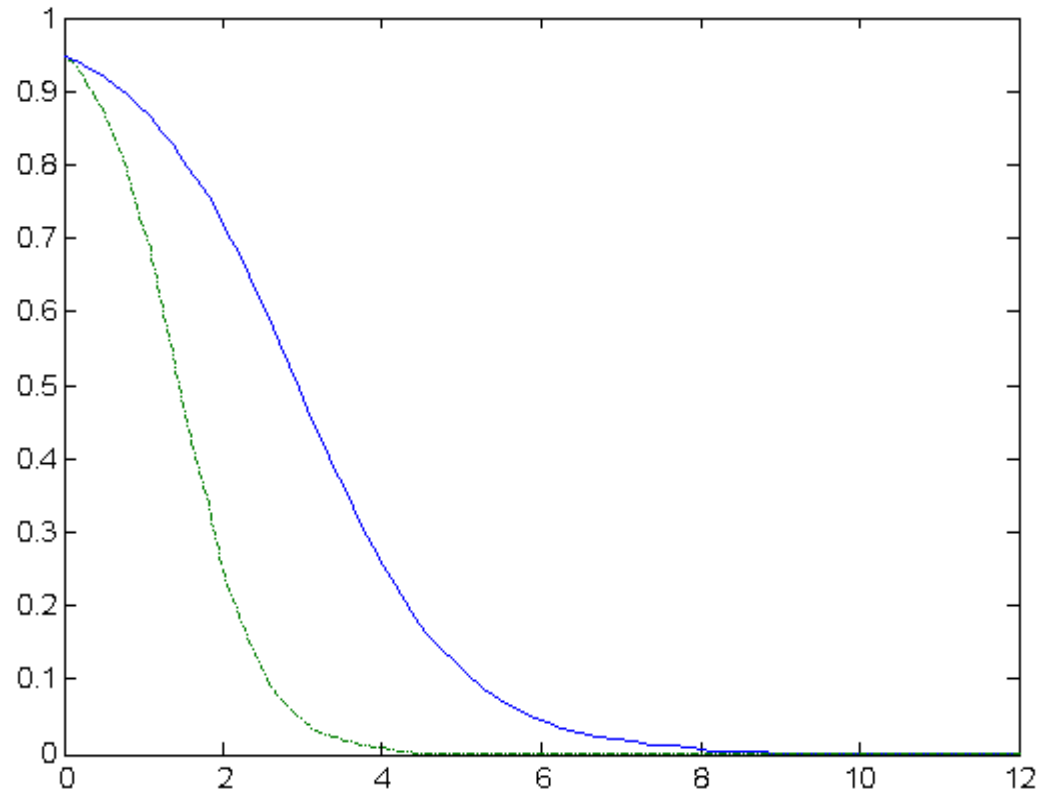
The dynamics of the experiment can be modelled with a logistic equation.

$$\frac{dA}{dt} = a_A A \left(1 - \frac{A}{K_A}\right)$$
$$\frac{dB}{dt} = a_B B \left(1 - \frac{B}{K_B}\right)$$
$$\frac{dC}{dt} = a_C C \left(1 - \frac{C}{K_C}\right)$$

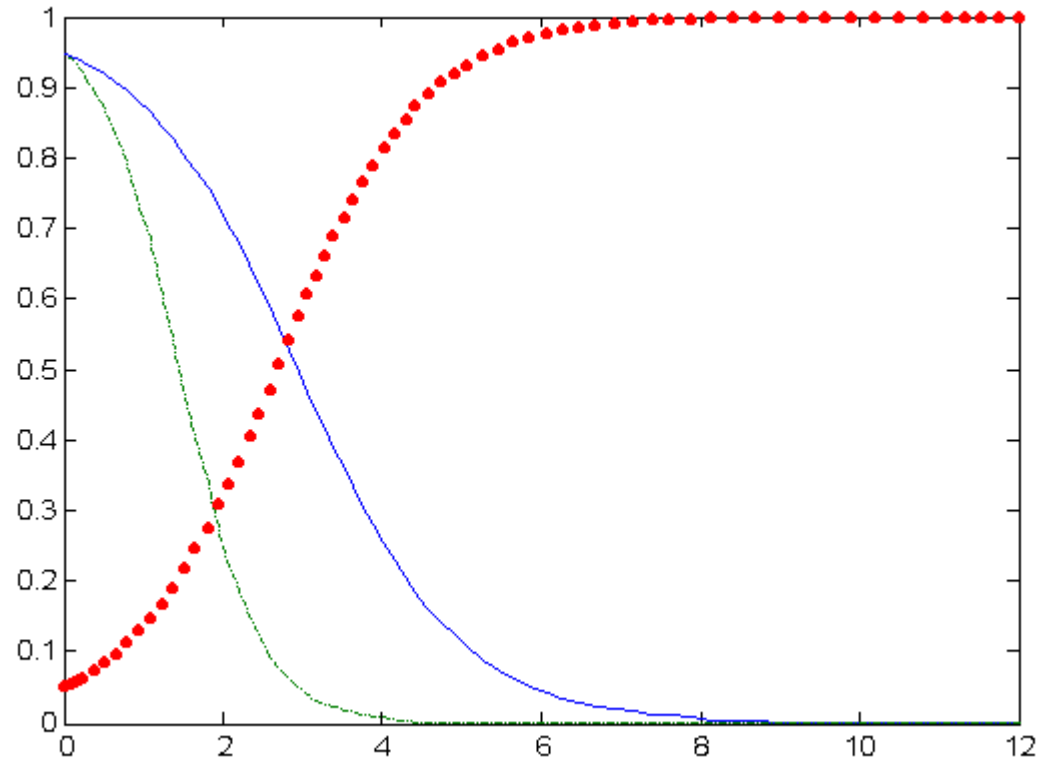
Any of our plasmids will confer antibiotic resistance to the bacteria, with them bacteria population will be able to grow exponentially.



When bacteria is grown with an antibiotic whose resistance it lacks its population will decrease.



When horizontal transport takes place, part of the population becomes resistant to both antibiotics and grows.



Conclusion and perspectives

- It is possible to detect HGT events with the biobricks currently available.
- Potential modification for automatization
- Easily modified for detecting other mechanisms of HGT.

Additional work

- Turing patterns project in progress.
- Increased participation.

Acknowledgement

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