



SYNTHETIC BIOLOGY WORKSHOP – “MEET THE SYN BIO”

Description of the logistics of the synthetic
biology workshop prepared by Team Uchile
Biotec

Human Practice Coordination; Team Uchile Biotec



Introduction:

Synthetic biology is defined as the biomolecular synthesis or engineering of biological systems with new functions that are not found in nature. It is a discipline that, unlike biology, is not based on the study of living beings, but rather has the objective of designing biological systems that do not exist in nature. Synthetic Biology seeks the creation of new programmable organisms, that is, the creation of on-demand microorganisms that behave like small computers.

Team Uchile Biotec seeks to deliver the fundamental tools and concepts of synthetic biology, explaining their basic concepts, the importance of discipline in technological development, and in passing demystifying terms of biotechnology in general.

Design of modules:

Note: The present description and the parts / materials to be used may vary a bit at the time of presenting the final version of the workshop.

This work is intended for people of secondary education, has a duration of one hour, and is structured in three modules:

a) Introduction to genetics: The basic concepts of what is a gene, a protein, transcription and translation of proteins and the importance of the latter, model microorganism (and bacteria), and introduction to genetic circuit will be explained

b) Principles of synthetic biology: The different mechanisms of expression of reporter genes and of selection will be shown, the mechanisms that are used to work with the expression / repression of genes, both artificial and naturally existing and that are combined with engineering concepts (for example: logical doors). The principles of abstraction, modularity and standardization will be explained.

c) Applications of synthetic biology: It will show some of the applications that synthetic biology has managed to generate in different areas: biomedicine, industry, environment, among others. In addition, the work of our team in the iGEM competition will be announced.

The material to be used is a set of wooden units that represent the different genes, mRNA, promoters and term sequences, while the smaller cubes, spheres or other represent the proteins. All this will be inside a space that represents the interior of a cell (usually, most modules require that they are E. Coli). In sum, each procedure shown in the workshop provides interactive visualization of the different synthesized proteins, cell metabolism, among others, making the workshop experience as striking as possible. For more details of the different mechanisms of synthetic biology or genetics to be explained in this workshop, see the section "Annex".

Gallery:



Image 1: "¿Qué es la biología sintética?". Made by Human Practice

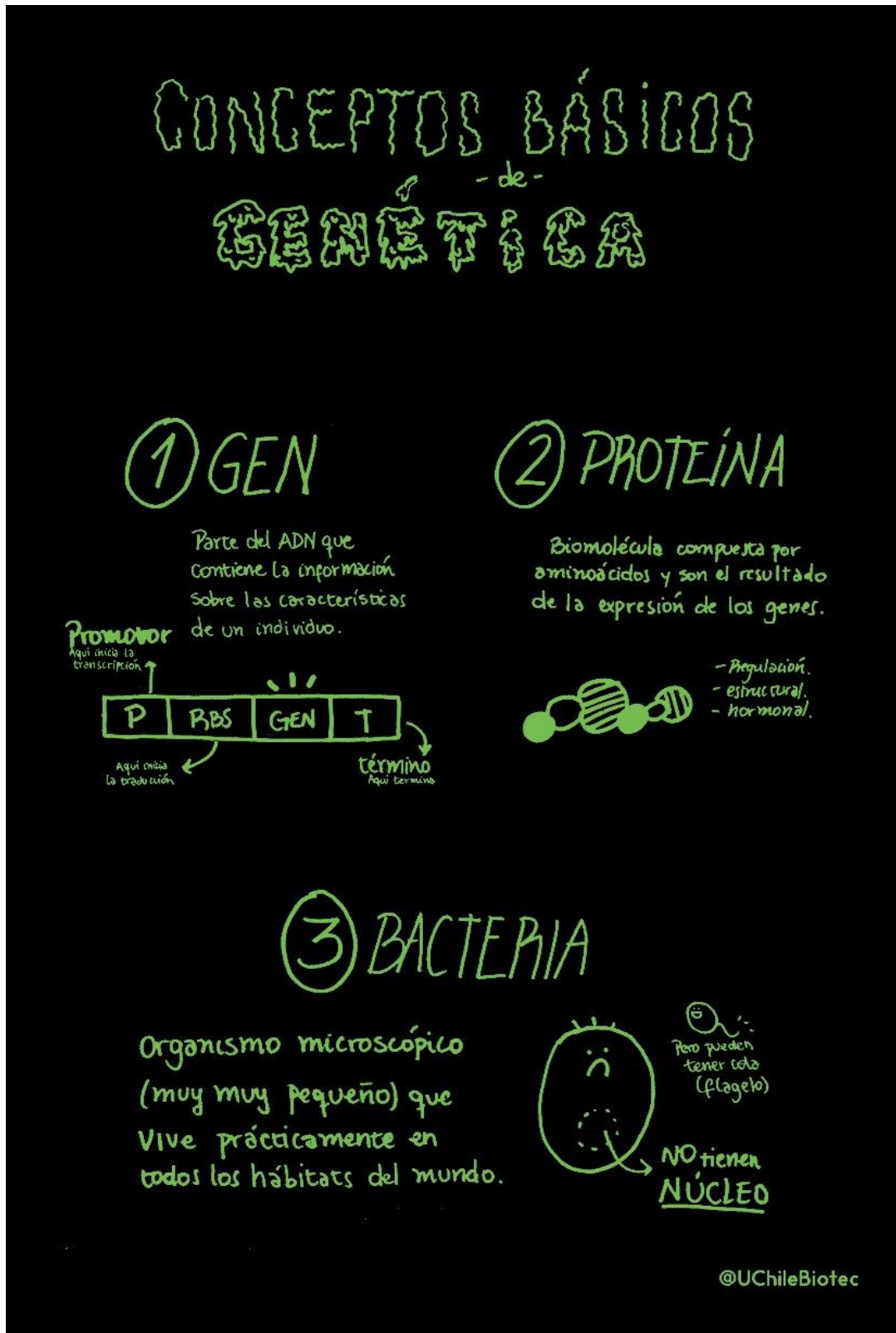
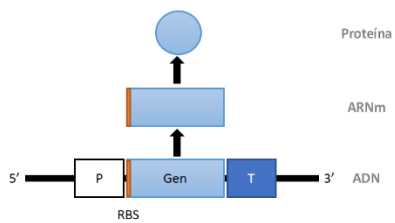
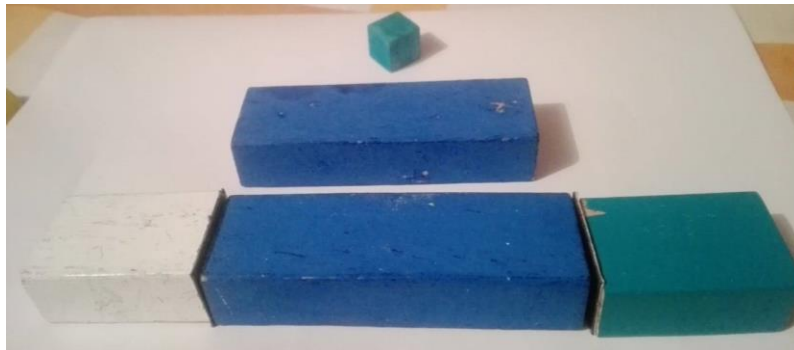


Image 2: "Conceptos básicos de genética". Made by Human Practice

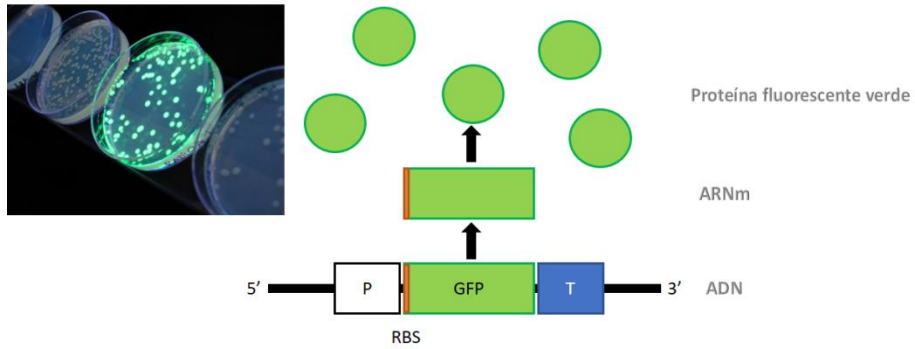


Image 4: Type of pieces to use in the workshop. It consists of simple pieces of wood with magnets on the edges, in addition to small cubes that represent proteins, and other accessories



Esquema general: Transcripción/Traducción

Image 5: Comparison between the scheme of the mechanism of transcription and translation and a representation using our material



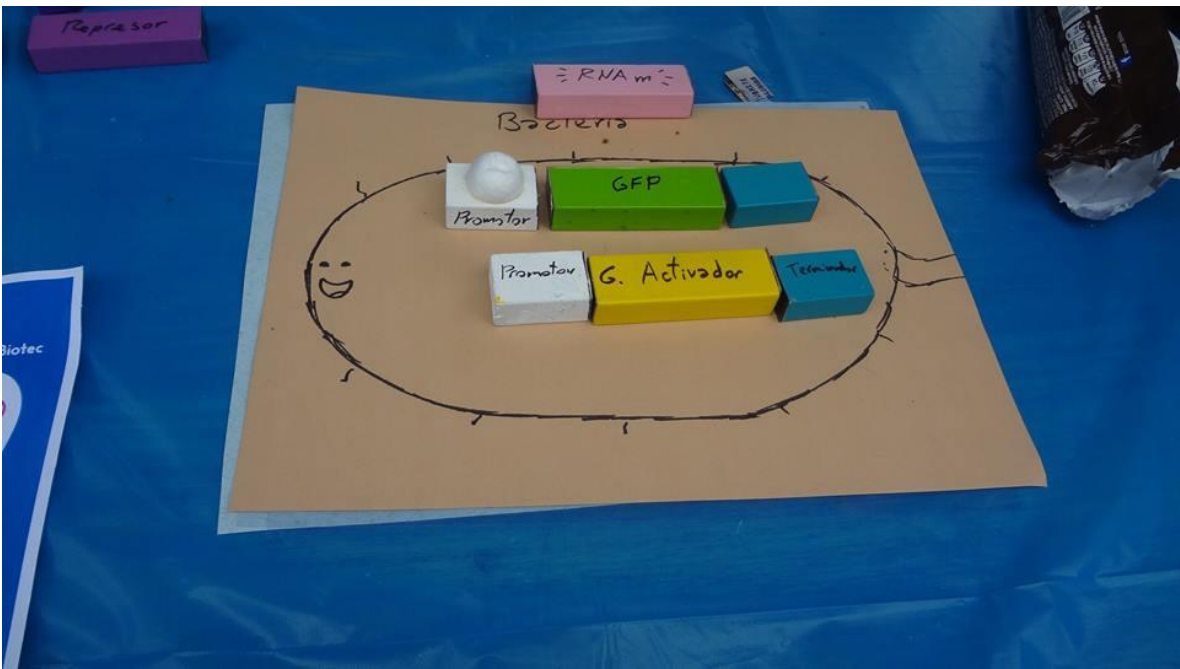
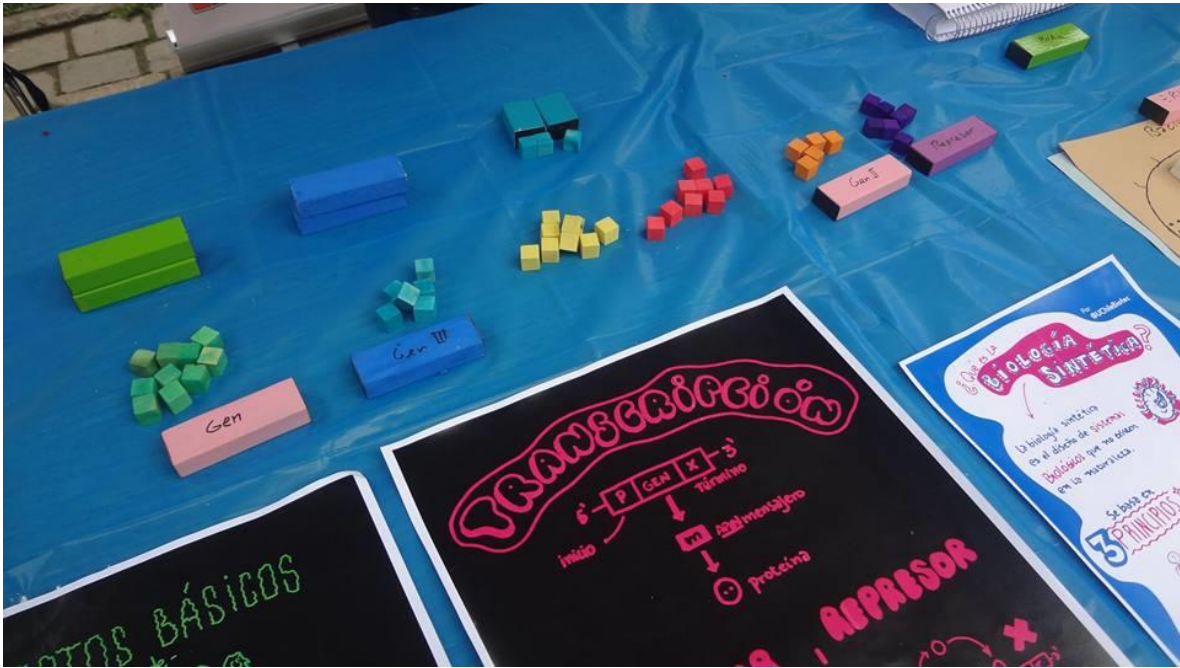
Funcionamiento de un gen reportero (GFP)

Image 6: Comparison between the performance scheme of a reporter gene (green fluorescent protein gene or GFP) and representation with our material

* To see all the available schemes, see "annex"

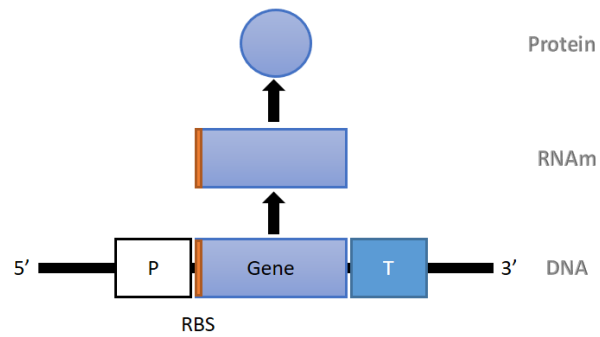
Photos: The following images are photos obtained from the participation of the group in the scientific fair "Ciencia en la Plaza" with a part of the workshop. This is to test the performance of the most important parts of the workshop at different public.



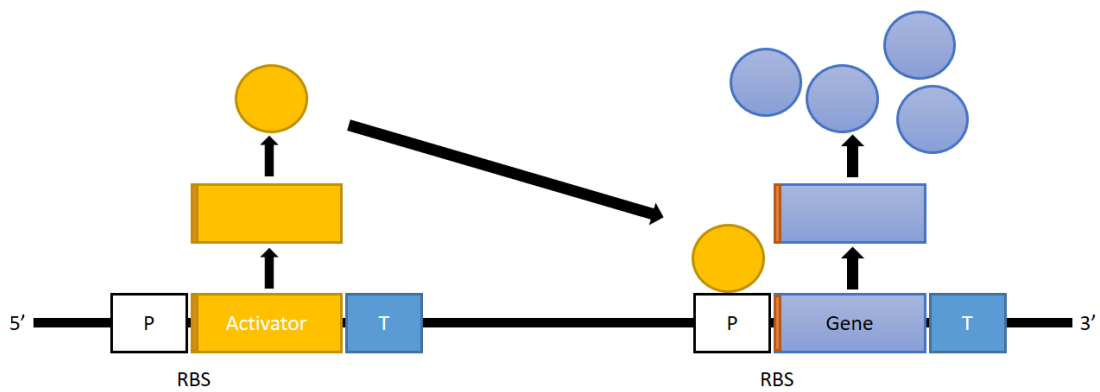




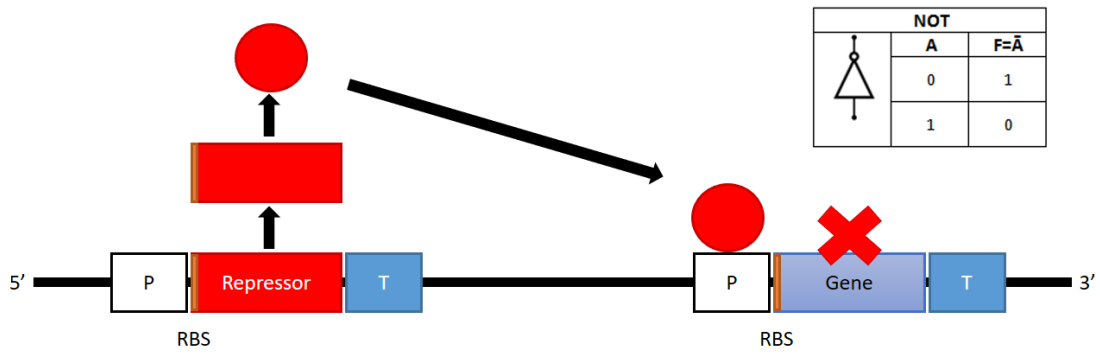
Annex:



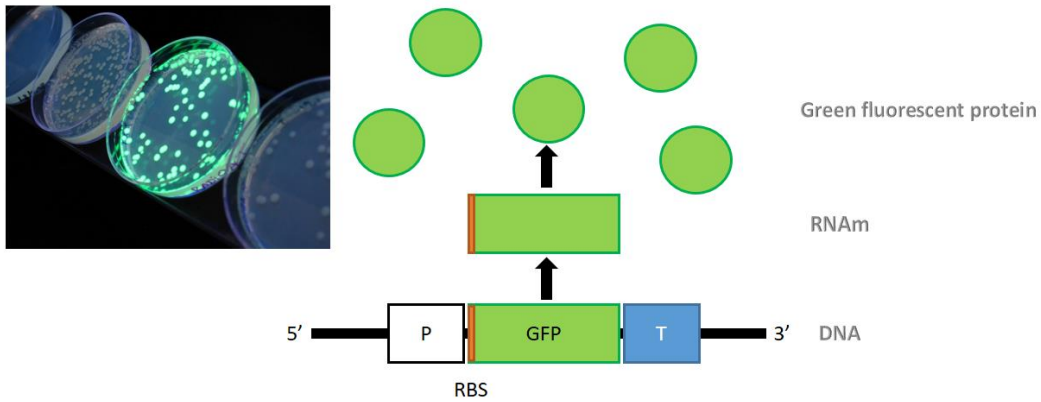
General scheme: Transcription/Translation



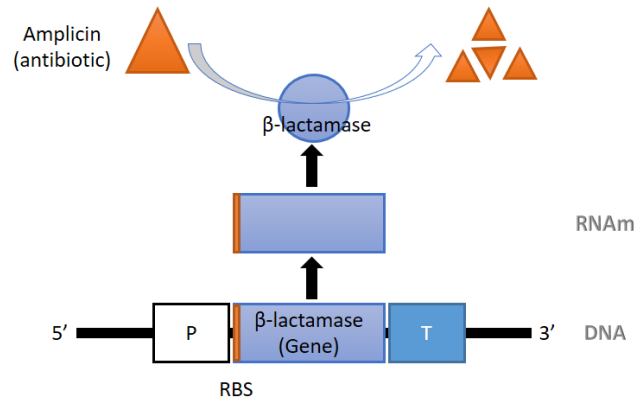
Operation of an activator



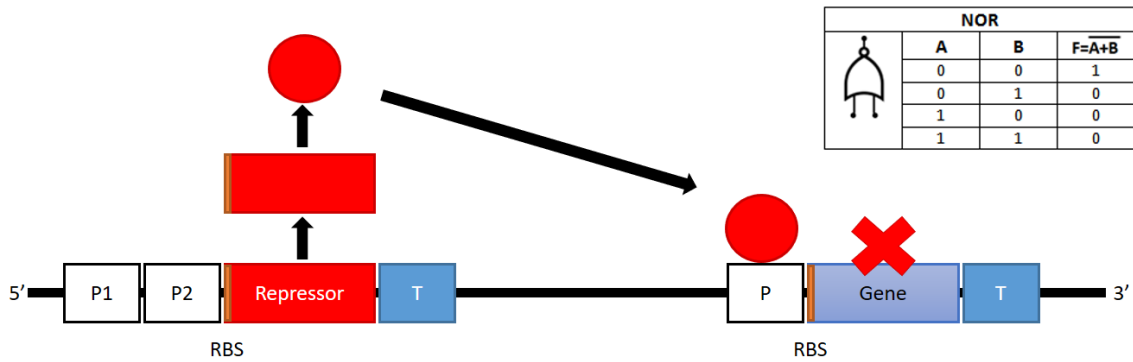
Operation of a repressor (NOT)



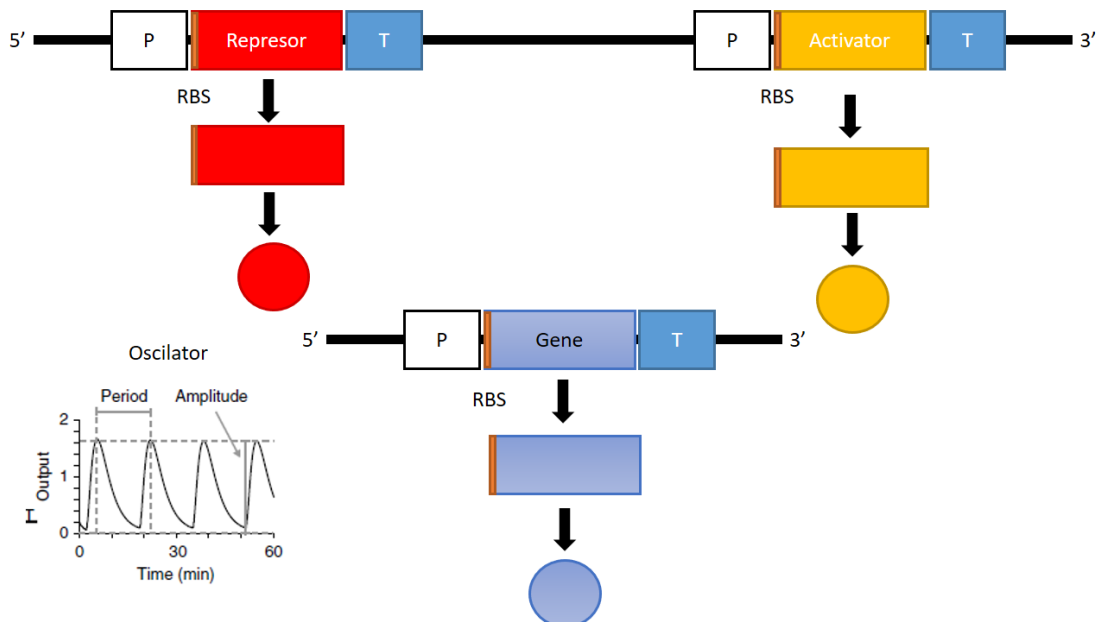
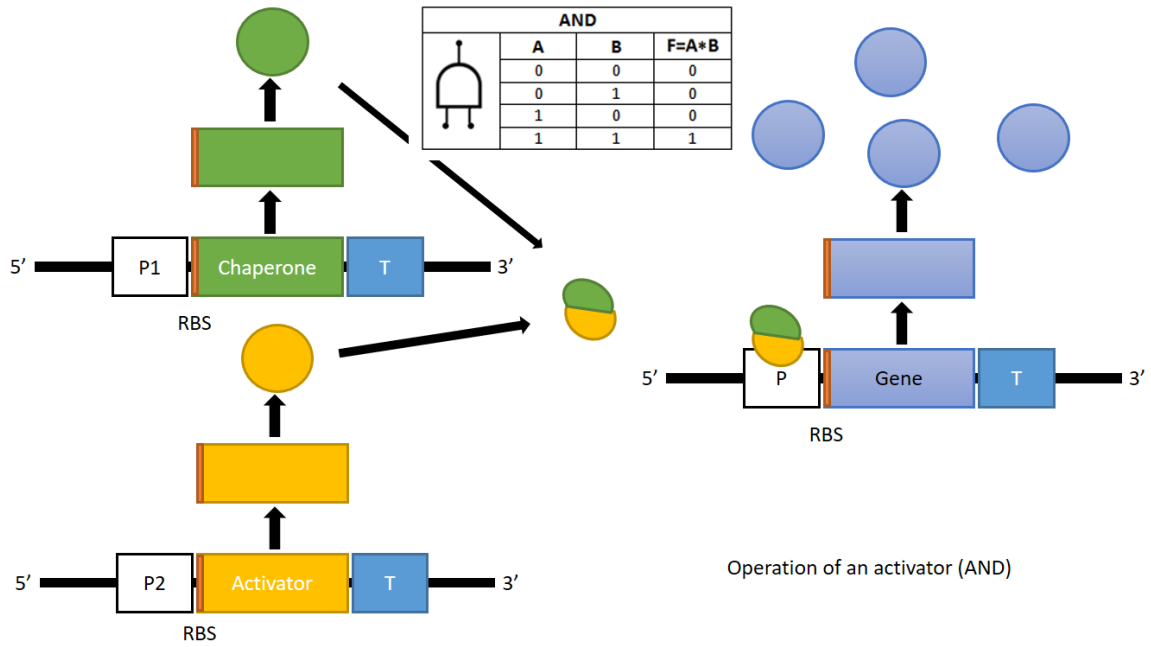
Operation of a reporter gene (GFP)

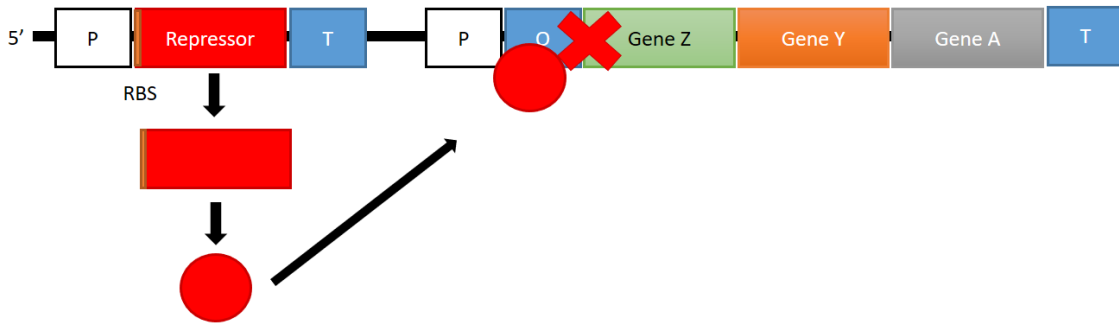


Operation of an antibiotic resistance gene

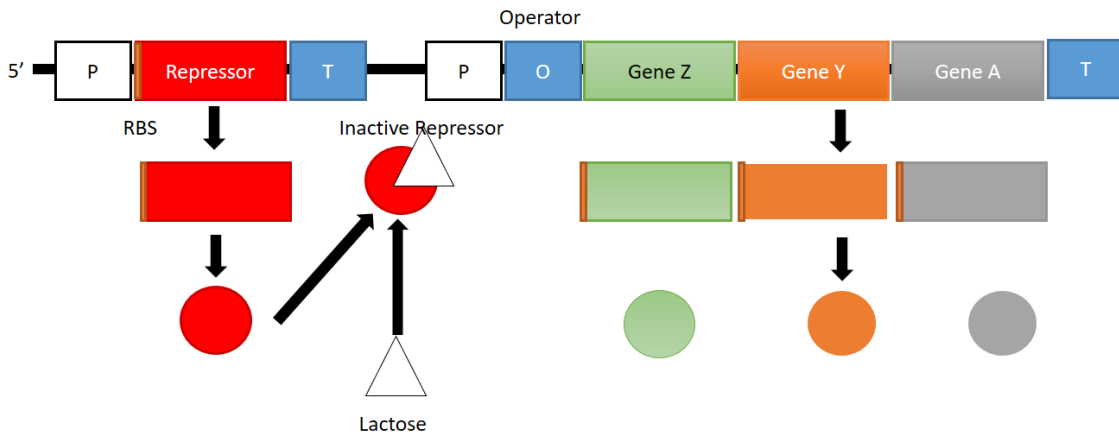


Operation of a repressor (NOR)





LAC operon (Without Lactose)



LAC operon (With Lactose)

