Super Yoghurt

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Abstract

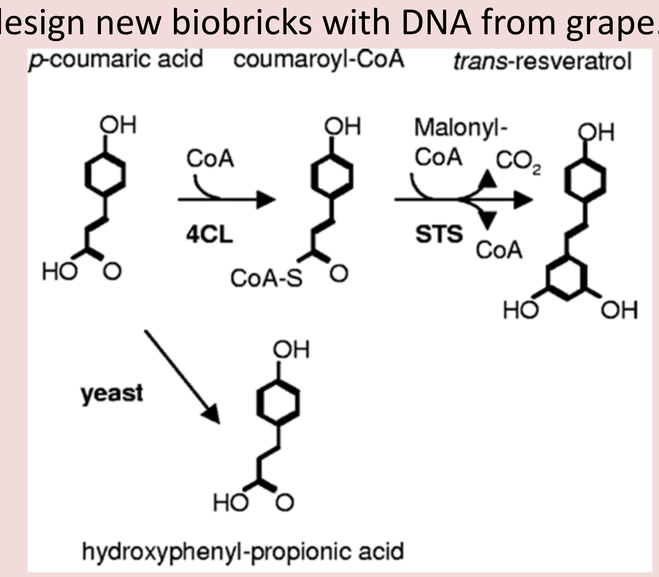
The **iGEM Bordeaux 2013** Project was to produce a **new range of lactic cultures** able to **produce natural flavours**, **dyes** and **molecules** with health benefits in a yoghurt. The **necessary routes of biosynthesis** will be introduced by transformation in ***Lactobacillus bulgaricus*** and ***Streptococcus thermophilus***, agents of lactic fermentation. With this in mind, a work of **optimization** on the **genetical modifications of lactic bacteria** has been done. This project will allow in time an easier production of custom yoghurts with beneficial and healing properties, while avoiding the use of substances derived from chemical synthesis which is costly and harmful to the environment.

The project : Resveratrol

Resveratrol is a **polyphenol** that can be found in several plant species including **grapevines** and **berries.** It has been shown to have potent **antiaging** and **health-promoting activities**.

With its medical properties, resveratrol could be an interesting compound to add to yoghurt.
However, bacteria cannot naturally produce resveratrol. That is why in this part of our project, we wanted to **introduce resveratrol pathway** in ***Lactobacillus*.**

In this purpose, we focused on the enzymes of this pathway. Two enzymes are necessary to make bacteria produce resveratrol : 4CL and SLC. Our project is based on Rice iGEM Project of 2008. We wanted to design new biobricks with DNA from grape.



Production of Resveratrol in Recombinant Microorganisms ; Jules Beekwilder*, Rianne Wolswinkel, Harry Jonker, Robert Hall, C. H. Ric de Vos and Arnaud Bovy

The project : Dyes and Flavours

We focused on different dyes and flavours:

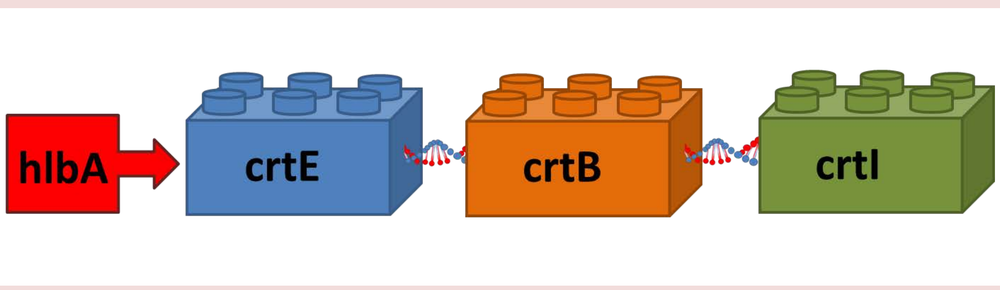
•***Red pigment: lycopene***

Lycopene is a red compound of the **terpene family** from Farnesyl phyrophosphate (a substrate present in *L.bulgaricus*).

Three enzymes are required to get lycopene : **crtE**, **crtB** and **crtI**. These enzymes already exist in biobricks (**Edinburgh 2007-2008**): BBa_K118002 and BBa_K118003. Our goal was to reuse these biobricks, make them **express in *E.coli***, and then **transform *L.bulgaricus*** with a constitutive promotor of lactic bacteria.

The final biobrick designed is:

BBa_K1148003 : crtE + crtB + crtI under hlbA promoter (phlbA)



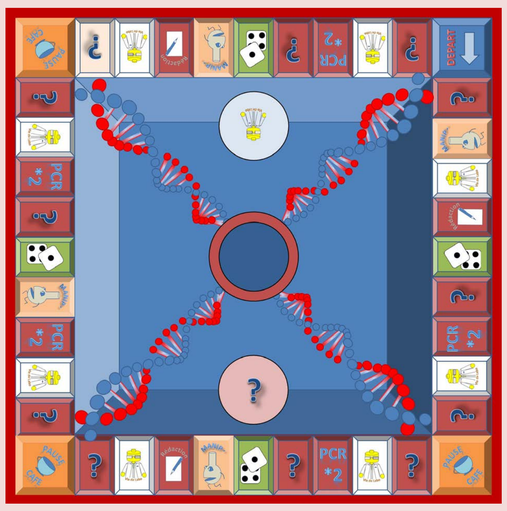
- ***Orange, yellow, purple, dark green and light green pigments***
- ***Limonene, Terpineol, Myrcene and Geraniol flavours***

Human Practice

❖ 

We have created the **Virtual Lab** : a dedicated **Online Information Management System** to help Igem teams to visualize the progress of their **project in real time** and **share** with their off-site team members.

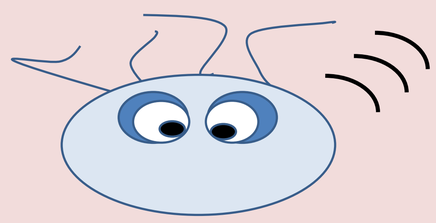
❖ The BioGame



Why not **entertain** yourself with **biology**? In this purpose, we designded the **BioGame**, not only for biologists but also for non-initiates. Get the different parts of your **project card** by answering biology questions and have fun!

❖ The iGEM House

Synthetic Biology and **House of the future**. We imagined a house in which many **iGEM projects** would be every days used tools.



WiFi Coli, a Communicolight System, Mexico 2000

Conclusion and Perspective

➢ **Colors and flavors**

Design of new potential biobricks
⇒ Manage to end these constructions for a transformation in *E.coli* then *L.bacillus*

➢ **Resveratrol**

Extraction of RNA from grapevines done
⇒ Biobrick construction to produce resveratrol

➢ **Human practice**