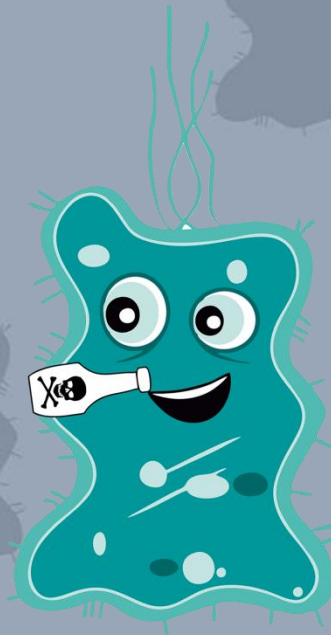


Team Gdansk-UG presents:

MethoLi

Biological methanol sensor



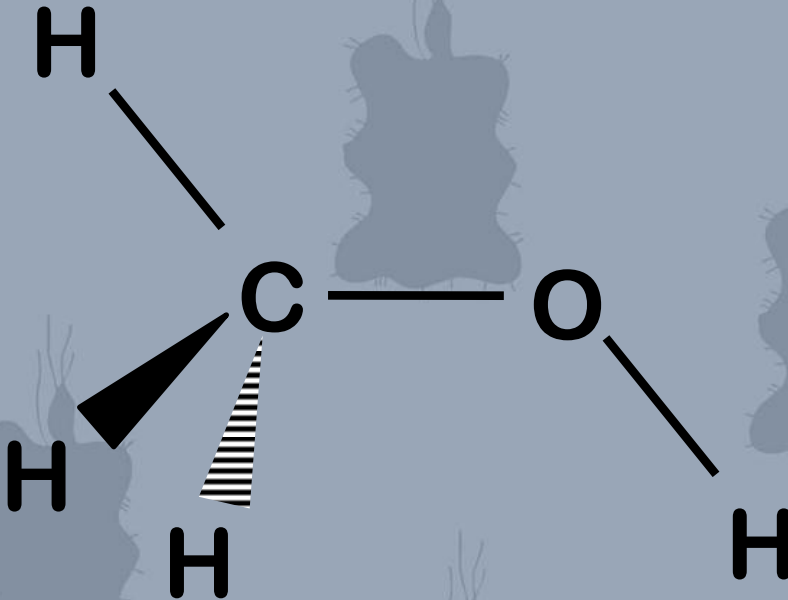
Meet the whole team



Aims of our project

- **Create an easy and ready-to-use at home methanol detector**
 - **Construct a strain of bacterium that would be able to report methanol presence in ethanol solutions**
 - **Improve the ethanol resistance of the strain**

Why this subject?



Methanol metabolism

Ethanol

Acetaldehyde

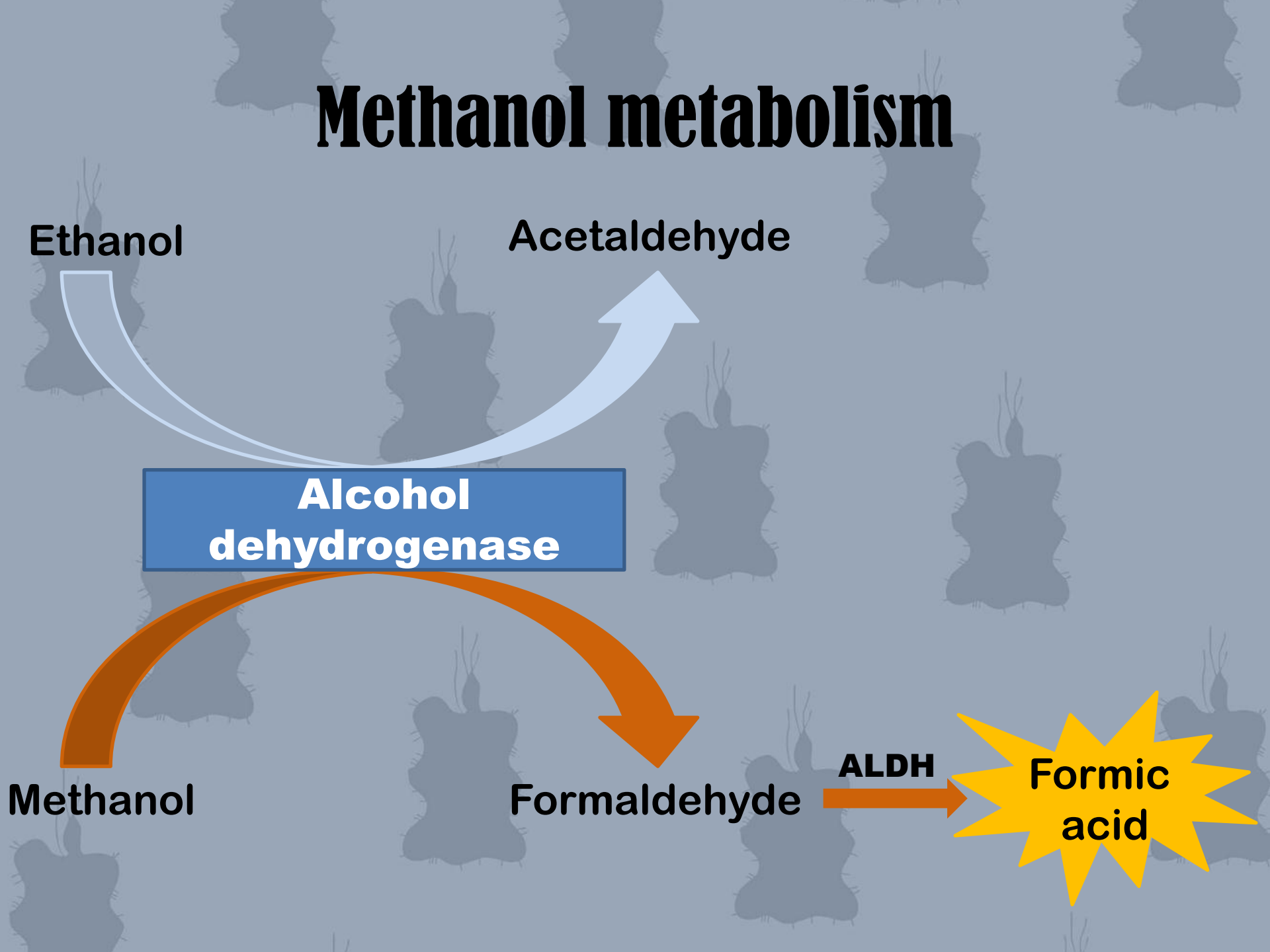
**Alcohol
dehydrogenase**

Methanol

Formaldehyde

ALDH

**Formic
acid**



Why this subject?

- **Ethanol contaminated with methanol**
- **Methanol poisoning**
- **Lack of a simple test that can be performed at home**

Why *E. coli*?

- **Well known model organism**
- **Gram negative – similar expression system to bacterium, from which we will isolate our parts**
- **Possibility of increasing ethanol resistance**

Overview of our project

- **Methanol detection will be achieved by using methanol-dependent promoter and reporter gene under its control**
- **Methanol-dependent promoter is isolated from *Methylobacterium organophilum***

Problems to solve

- **Reporter protein must be visible without special aparature**
- **Bacterium which will perform detection must tolerate ethanol**

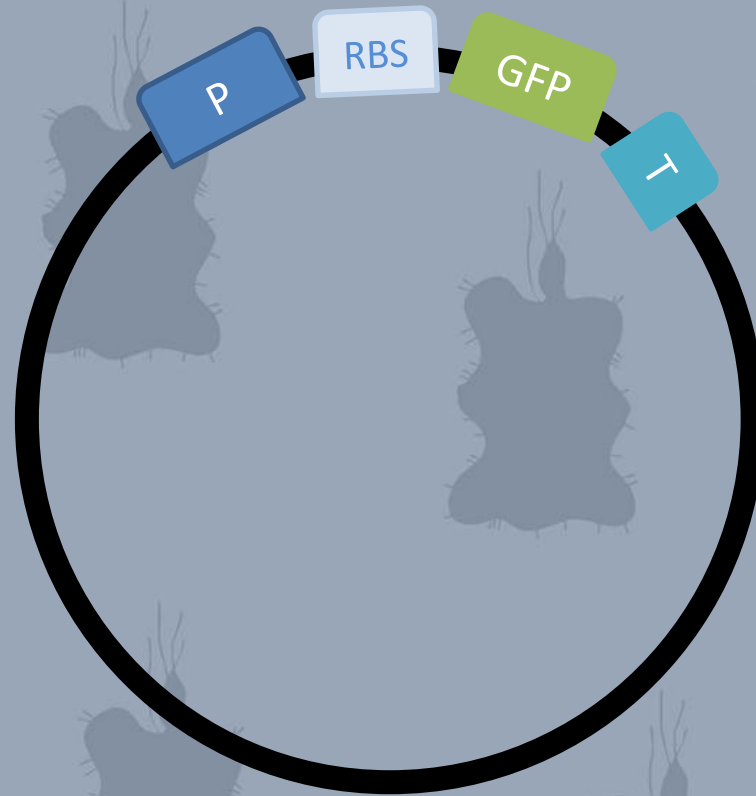
Methylobacterium organophilum

- **Methanol as a sole carbon source**
- **Methanol-dependent promoter which controls production of methanol dehydrogenase**

Zymomonas mobilis

- **Gram negative**
- **Tolerance to ethanol concentrations up to 16%**
- **pKT230 plasmid as a backbone for *Z.mobilis* transformation**
- **Transformation by electroporation**

Construct design



P – Bba_K1038001

RBS – Bba_B0034

GFP – Bba_E0040

T – Bba_B0015

Experimental set-up

1.

- **Isolation genomic DNA, PCR, purification of PCR product**

2.

- **BioBricks assembling**

3.

- ***E. Coli* transformation**
- **Measuring the strength of promoter**

Experimental set-up

4.

- **Ligation of plasmid pKT₂₃₀ with promoter, RBS, GFP and terminator insert**

5.

- ***Zymomonas mobilis* transformation**

6.

- **Measuring level of reporter protein production in different methanol concentrations**

Results

- **New part:**
 - **Bba_K1038001 – methanol-dependent promoter**

Unfortunately due to the lack of time we couldn't check strength of the promoter...

But we will do it right after the Jamboree :)

pKT₂₃₀ plasmid with insert construct – ready for the transformation step.

Propagation of idea of synthetic biology

- **We made a short movie explaining basics of synthetic biology and our project**
- **Over 32 000 views in one month!**
- **Thanks to our wonderful media supporters we were able to publish our short articles about synthetic biology in several well-known news and scientific portals**

Acknowledgements



We would like to thank following people:

- **Our instructors: Dr Robert Czajkowski and Prof. Bogdan Banecki, for providing us with indispensable knowledge**
- **All the scientists and students in Intercollegiate Faculty of Biotechnology University of Gdańsk – Medical University of Gdańsk – for the help, patience and not losing hope in us**
- **Our sponsors – for believing in the idea of our project and providing us with all the materials that we need**



Thank you for your attention!

