Team Gdansk-UG presents:

MetOli

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

Formic acid

ALDH
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 apparatus

• 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 pKT$_{230}$ with promoter, RBS, GFP and terminator insert

5. *Zymomonas mobilis* transformation

6. Measuring level of reporter protein production in different methanol concentrations
• **New part:**
  - Bba\_K\textsubscript{1038001} – 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 :) 

pKT\textsubscript{230} 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
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 Gdansk – Medical University of Gdansk – 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!