eau d'e coli | mit igem 2006

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overview

This summer, MIT's iGEM 2006 team engineered Escherichia coli to produce a wintergreen scent during exponential phase and a banana scent during stationary phase using only endogenous metabolites.

Thus, our project demonstrates that:

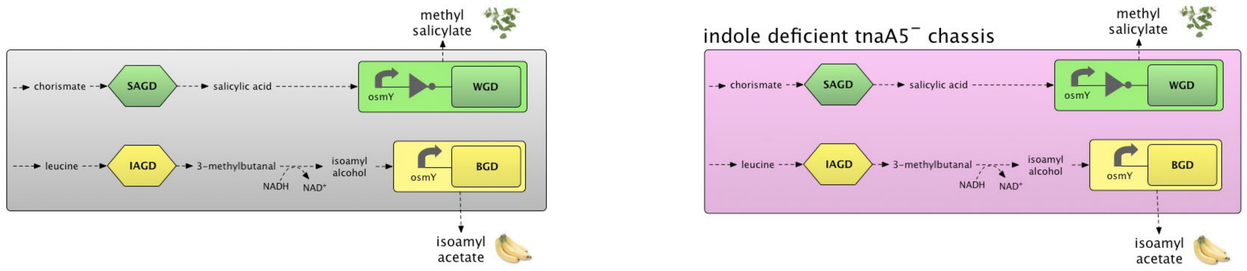
1. It is indeed possible to design, build and test a synthetic biological system over the course of a summer.
2. Biosynthetic devices that produce scented compounds can be successfully engineered in E. coli.
3. Biosynthetic devices can be purposefully regulated via transcription based control devices.

key contributions

BB	Name	Description	Source	Ref.
J45017	pchBA	Salicylic Acid synthesis	P. fluorescens	(1)
J45004	BSMT	Converts S. Acid -> M. Salicylate	Petunia X hybrida	(2,3)
J45008	BAT2	1st step in Iso. Alcohol synthesis	S. cerevisiae	(4)
J45009	THI3	2nd step in Iso. Alcohol synthesis	S. cerevisiae	(4)
J45014	ATF1	Converts I. Alcohol -> I. Acetate	S. cerevisiae	(5)
J45992	osmY	Stationary Phase promoter	E. coli	(6)

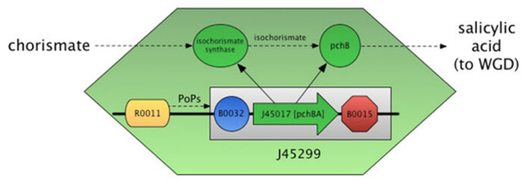
systems

the complete system

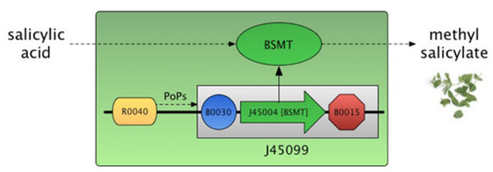


the devices

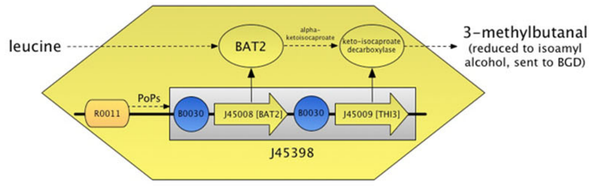
J45300 – Salicylic Acid Generating Device (SAGD):



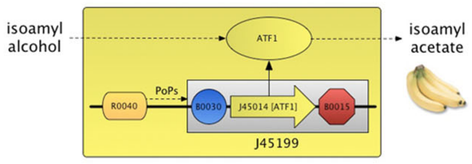
J45100 – Wintergreen Generating Device (WGD)



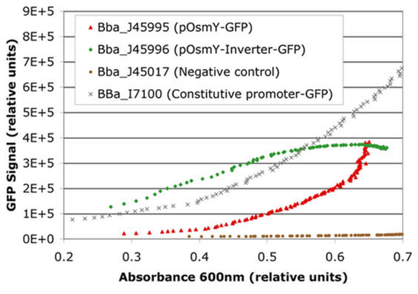
J45400 – Isoamyl Alcohol Generating Device (IAGD):



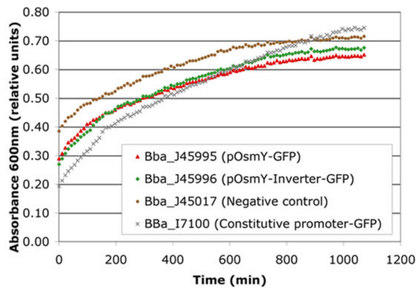
J45200 – Banana Generating Device (BGD)



characterization

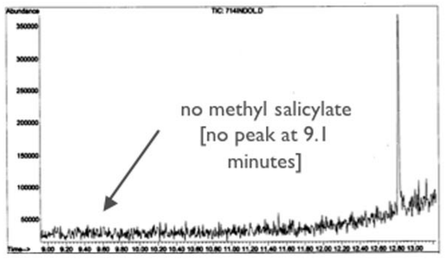


Characterization of stationary phase regulatory mechanism using GFP fluoresence assays: J45992 [osmY] + GFP (yellow); J45992 with signal inverted by Q04401 + GFP (green); control constitutive promoter + GFP (grey); no GFP (purple).

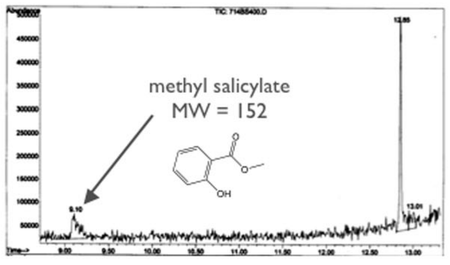


Cell growth curves: cells reach stationary phase at absorbance ~0.5

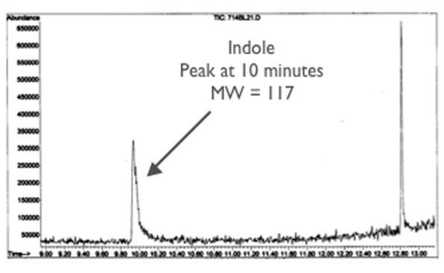
E. coli



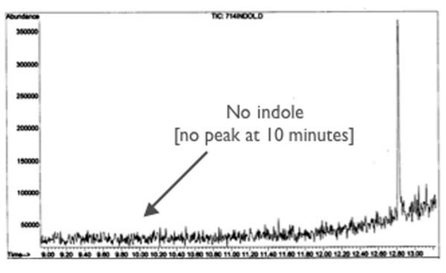
E. coli + precursor (SA) + WGD



wild type *E. coli*



chassis: tnaA5⁻ *E. coli*



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