



Genome Editing Strategies for Biosafety of SynBio Agents

Supervisors: Enrique Asin-Garcia

Contacts: enrique.asingarcia@wur.nl + edoardo.saccenti@wur.nl

Type of thesis: Experimental

Required competences: Basic molecular biology techniques (bacterial cell growth culturing, transformation, PCR amplification, gel electrophoresis, restriction-ligation assembly, etc.), basic oligonucleotide design.

Acquired competences: MetaAssembly, recombineering, CRISPR-Cas9, NGS, real-time qPCR, fluorescence and growth assays, knock out, knock in, fitness assays, escape frequency analysis.

Date: 08-10-2020 date the project was proposed

Description

Synthetic Biology has brought gene modification to the next level. Many microbes, especially those ones of industrial interest, are being redesigned to substantially enhance their commercial value and properties. However, the biosafety issues that may arise from these practices can be addressed since the early stages of the research through a safe-by-design approach: safer SynBio by applying SynBio strategies!

Within this project, you will be able to work with different cutting-edge genome editing tools such as CRISPR-Cas9 and recombineering from a biocontainment perspective. Our aim is BIOSAFETY ENGINEERING, meaning the development and implementation of different genetic safeguards in cell factories in the shape of genome rewriting, metabolism remodeling or genetic circuits. We also applied high-throughput methods to assess our strategies and tools, including NGS and multiplex genome editing.

At the moment, there are several projects ongoing focusing in different genetic safeguards. If you are looking for a thesis in Synthetic Biology and are eager to learn a lot of cool stuff about genome editing, do not hesitate to send us a message to check out the possibilities.



References

1. Schmidt, M. & de Lorenzo, V. Synthetic bugs on the loose: containment options for deeply engineered (micro)organisms. *Current Opinion in Biotechnology* 38, 90–96 (2016).
2. Gallagher, R. R., Patel, J. R., Interiano, A. L., Rovner, A. J. & Isaacs, F. J. Multilayered genetic safeguards limit growth of microorganisms to defined environments. *Nucleic Acids Research* 43, 1945–1954 (2015).
3. Wannier, T. M., Nyerges, A., Kuchwara, H. M., Czikkely, M., Balogh, d., Filsinger, G. T., Borders, N. C., Gregg, C. J., Lajoie, M. J., Rios, X., Pál, C., Church, G. M. Improved bacterial recombineering by parallelized protein discovery. *PNAS* 117, 13689-12698 (2020).
4. Asin-Garcia, E., Kallergi, A., Landeweer, L., Martins dos Santos, V. A. P. Genetic safeguards for Safety-by-Design: so close yet so far. *Trends in Biotechnology* (2020).