Producing the messenger vesicles

Addressing the message protein to messenger vesicles

Background

Bacteria are able to communicate together in order to adapt their behavior to the environment on a population-wide scale. Ideal cellular communication is based on the quorum sensing process involving the diffusion of small signaling molecules with a local range of action and cross-talking issues.

How can social studies of science enlighten ethical challenges in synthetic biology?

Biodiversity issues, Biosecurity concerns, Naturality and Artificiality configurations, Open-source and Governance issues...

Our team includes a sociology student that allowed to provide the team activities with daily discussions about ethical stakes and configurations, Opensource and Governance issues.

Message in a Bubble

A long-range communication system

Our project's objective consists in elaborating a chassis for long-range communication without dilution of the information, in bacteria. Harnessing the ability of the outer membrane of the bud and form vesicles, composing messages in these vesicles and building a specific reception system were the challenges to engineer a stable and specific vesicles-based, long-range cell-cell communication platform relying on the diffusion of “quanta of information” in the environment.

Producing & Addressing - Receiving

Results & Perspectives

As cell-cell communication is necessary for large-scale organization of any multiscale structure (cells, groups of cells…), bacteria do not have tools for efficient distant communication. For that reason, we have developed a chassis for a long-range vesicles-based communication system using “quanta of information” as signaling molecules. This platform is also the basis for an efficient cargo transportation in shafts. This bacterial monitoring, which is typically unstable across generations, is based on bacteria that are robust (the message remains protected and undamaged). It is not hard, given the way the development of new Synthetic Biology applications relying complex spatial organization, or collective task sharing and task performing by bacteria.

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Signal Transduction

Fec System: inducing a response

1- Fec A mutant anchored in the membrane
2- Activates constitutive FecA
3- Activates constitutive FecB
4- Buried to RNA Polymerase, beginning of the transcription of Fec-dependent genes FecA, FecB, FecN, RFP
5- Synthesis of FecC, N term (activated without interaction with FecA)

Fec System

Synthesis of FecC, N term (activated without interaction with FecA)

Signal Transduction

Autotransporter

Passenger

Signal

E. coli

Membrane Fusion

Fec System: inducing a response

1- Fec A mutant anchored in the membrane
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3- Activates constitutive FecB
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Signal Transduction

Autotransporter

Passenger

Signal

E. coli

Receiving the message vesicles and reading the message

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