Vibrio natriegens - A new chassis for Synthetic Biology

Waiting for cells to grow is an enormous time sink for synthetic biologists. Cloning cycles with the current standard, Escherichia coli, typically take up to three days. In our project Vibrigen - Accelerating Synbio, we established the tools to turn Vibrio natriegens into the next generation chassis for synthetic biology, ready to be used reliably. By taking advantage of its unbeaten doubling time of 7 minutes, we substantially reduced waiting time and made one-day-cloning a reality. We built and characterized a flexible golden-gate-based part collection, consisting of more than 100 parts, which enables the creation of complex pathways in a short amount of time. Our engineered V. natriegens strains VibriClone and VibriExpress are designed for cloning and protein expression applications, respectively. Moreover, we established the first synthetic metabolic pathway in this organism by producing the platform chemical 3-Hydroxypropionate and along the way developed an accelerated workflow for metabolic engineering.

VIBRIO NATRIEGENS

Vibrio natriegens is a Gram-negative, rod-shaped bacterium that was first isolated from seawater in 1958 (Kaila and Kaila, 1958). Vibrio natriegens has been used as a model organism because of its rapid growth (15-20 min doubling time) and its ability to grow in both liquid and solid media containing 3% NaCl.

MEASUREMENT

A new chassis requires redesigning existing procedures. We developed a new measurement workflow for pathway measurements with V. natriegens.

Workflow

- Setting up a 96-well plate with O2 concentration
- Sampling the culture for each well independently
- Measuring in a plate reader
- Analysis of data

MARBURG COLLECTION

132 diverse parts
- Mini-Vector Collection
- Protein Tags
- CRISPR/Cas9

VIBRIGENS - INTERLAB

Can you imagine working with V. natriegens in the lab?

ACCESSIBLE SCIENCE

Creating a culture-free, rapid, and cost-effective method for metabolic engineering.

I embody human practice and accessibility.

iGEM MARBURG

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