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Modelling metabolic network dynamics in a cheese bacterial community

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Modeling metabolic network dynamics in a cheese bacterial community

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19th International Conference on Computational methods in Systems Biology - 2021

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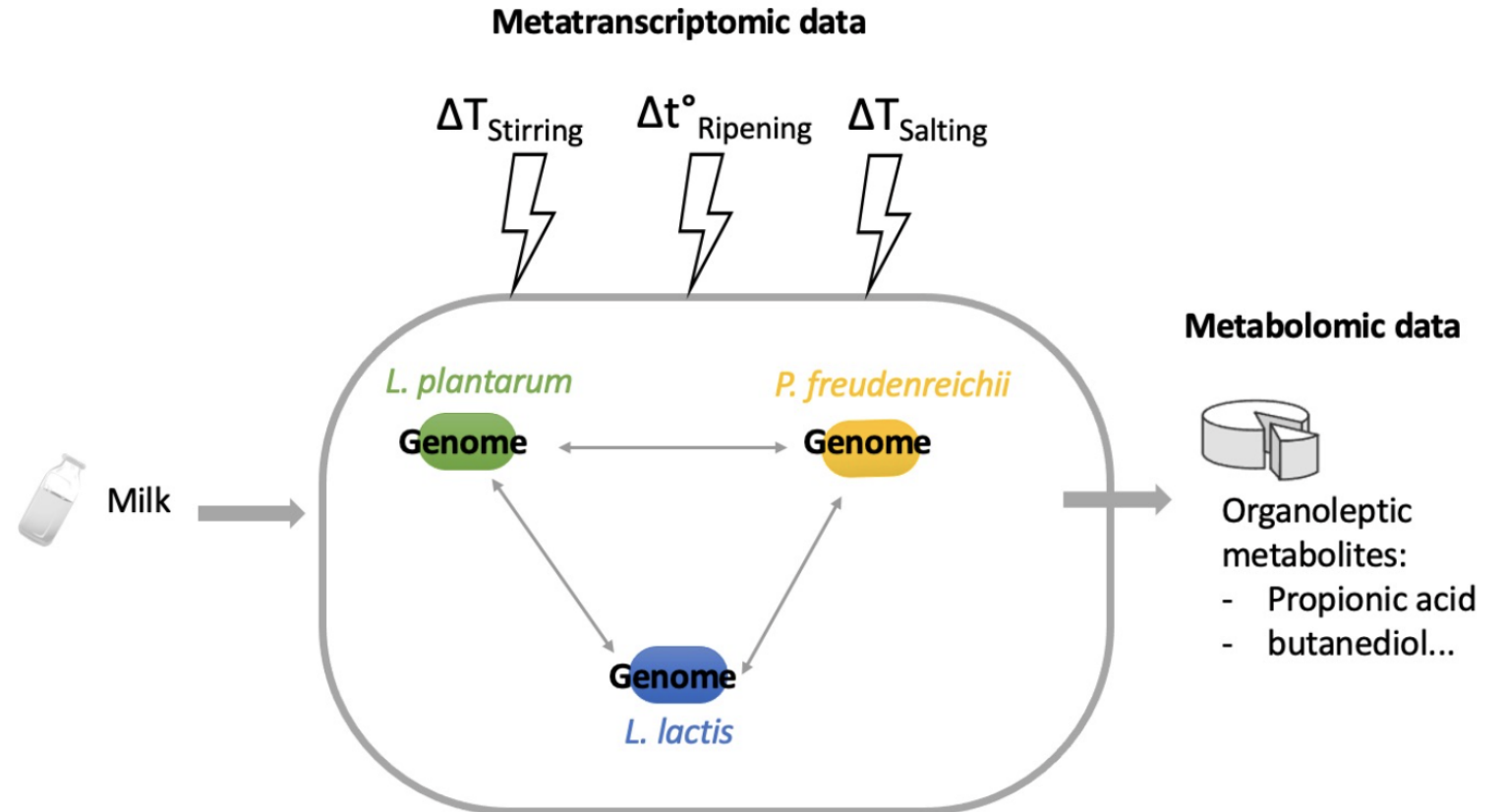

Cirm
Bact eries d'int er et alimentaire

 **CMSB**
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Modeling metabolic network deciphers interactions in a bacterial community

- Bacterial communities occur in every environment and are also important in industrial processes.
- Reveal interactions in a microbiota --> model the metabolism
- Study small cheese bacterial community --> small-scale controlled model



Integration of multi-omics data in the pipeline

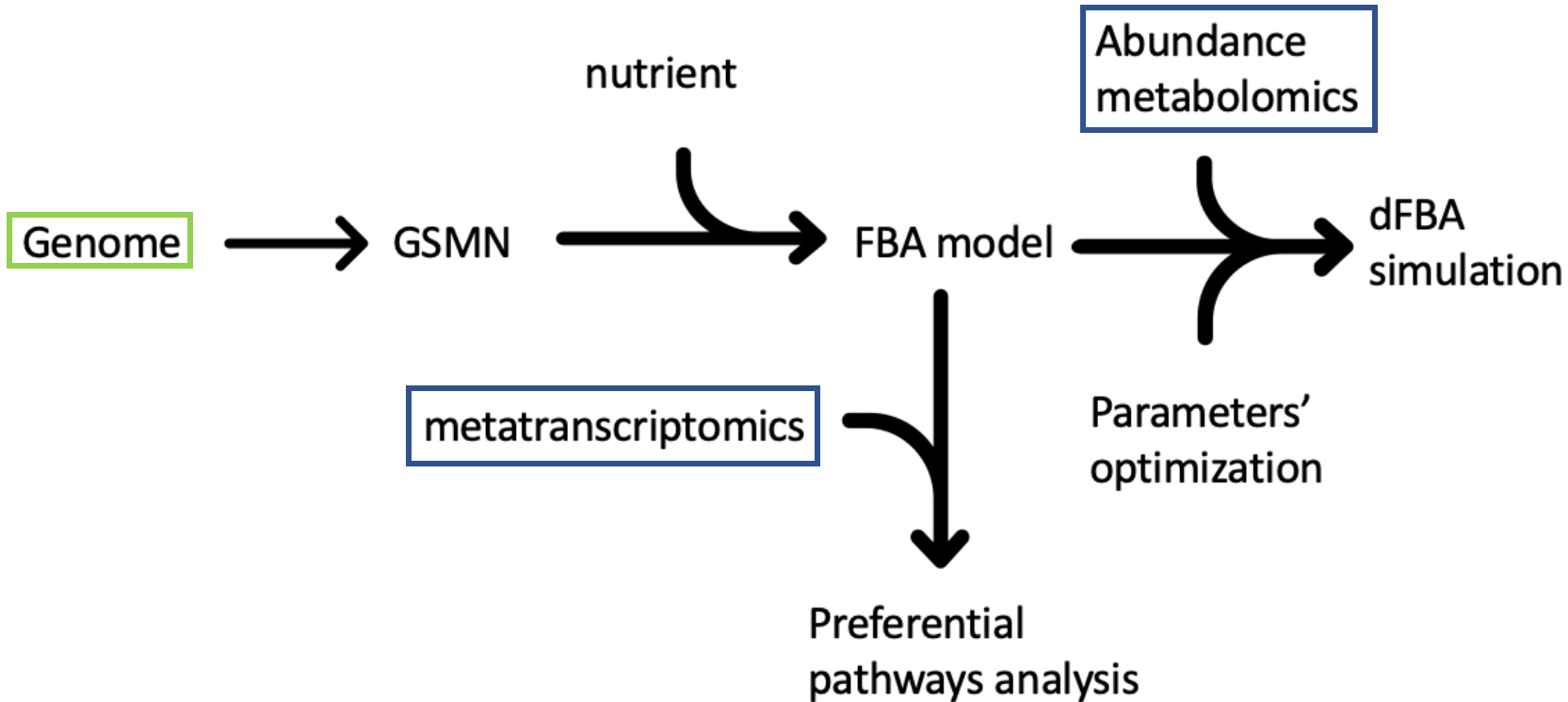


Figure 1: Pipeline used to run simulations on the small bacterial community (is being automated).

Interactions highlighted at the community scale

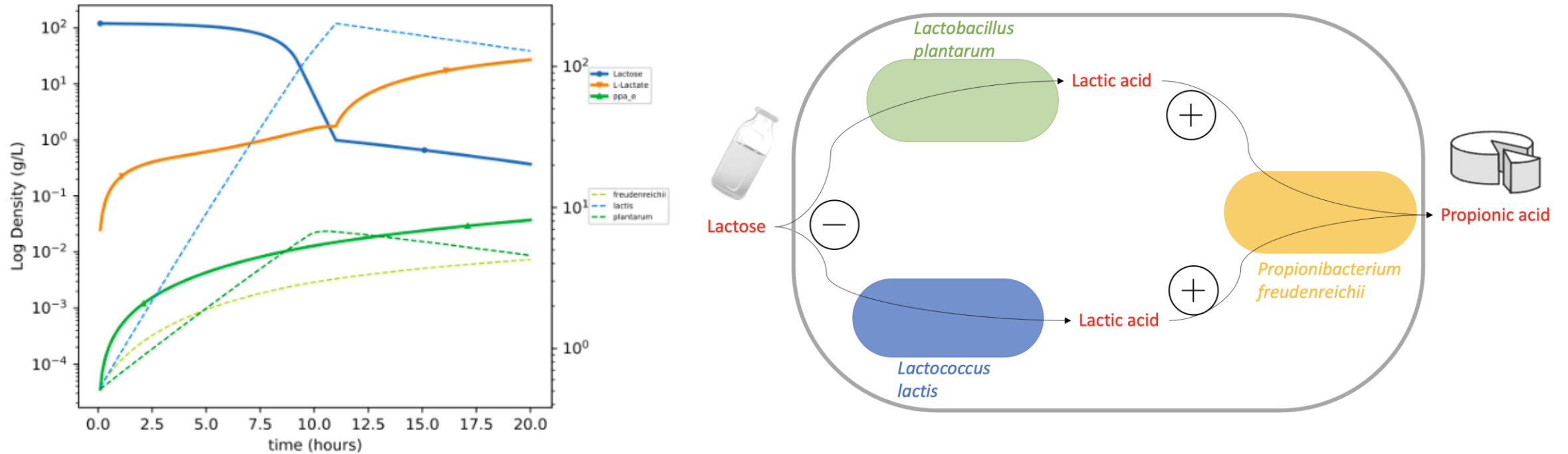


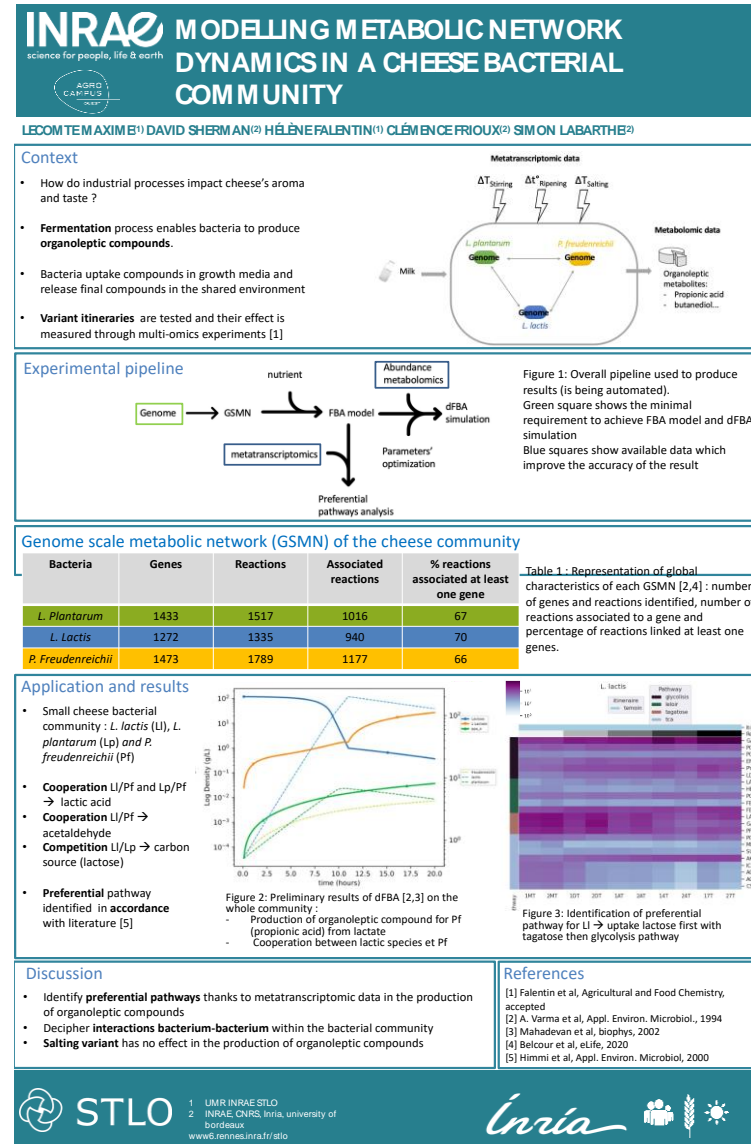
Figure 2: Preliminary results of dFBA on the whole community.

- Same interaction bacterium-bacterium are highlighted with metabolic modeling, tools [6] and literature
- Production of lactate by Lactic acid bacteria creates a mutualistic interaction with *P. freudenreichii* responsible of the production of organoleptic compounds

Modeling metabolic network dynamics in a cheese bacterial community

- Thanks for your attention

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- [1] Falentin et al, Agricultural and Food Chemistry, 2021
- [2] A. Varma et al, Appl. Environ. Microbiol., 1994
- [3] Mahadevan et al, biophys, 2002
- [4] Belcour et al, eLife, 2020
- [5] Himmi et al, Appl. Environ. Microbiol, 2000
- [6] Zelezniak et al, PNAS, 2015
- [7] D. Machado et al, Nucleic Acids Research, 2018

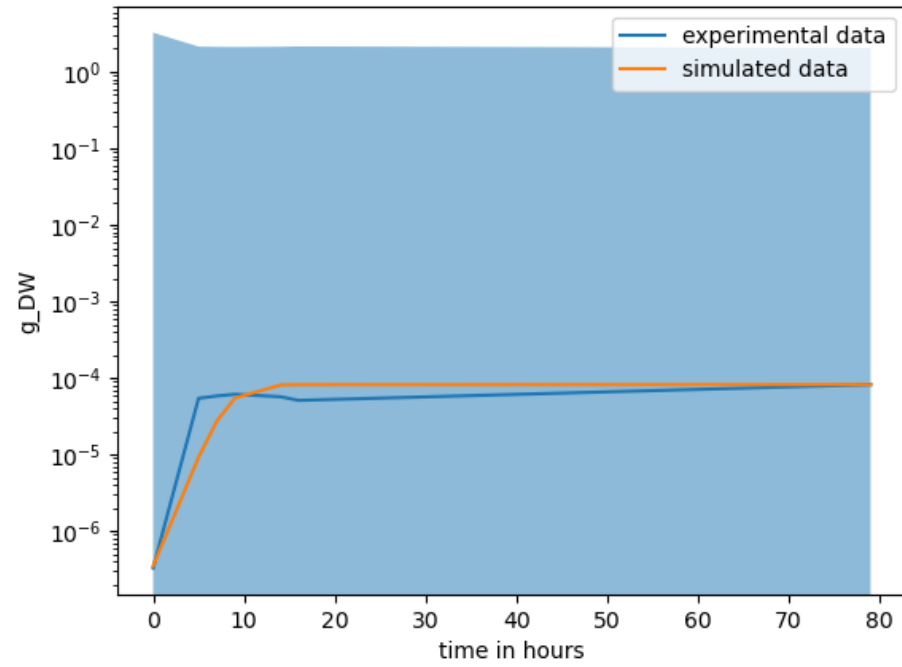


Figure 3: Comparison of growth rate of freudenreichii