

Author Contributions

Tahmineh Khazaei, Rory L. Williams, Said R. Bogatyrev, John C. Doyle, Christopher S. Henry, Rustem F. Ismagilov. 2020. "Metabolic multi-stability and hysteresis in a model aerobe-anaerobe microbiome community."

SI

Tahmineh Khazaei

- Hypothesis ideation with SRB.
- Design of study.
- Performed preliminary experiments with SRB: evaluating *Kp-Bt* community growth under various glucose conditions in batch culture.
- Built the mathematical model used in this study (Figure 2). Using the mathematical models predicted state-switching and hysteresis within the community and identified regions of bi-stability with respect to glucose and oxygen input conditions (Figure 3).
- Designed CSTR experiments. These experiments were performed by RLW and TK.
- Established the protocol for short chain fatty acids measurements (further optimized by RLW).
- Performed qPCR of the CSTR samples (Figure S5).
- Established the protocol for RNA extraction of CSTR samples for RNA sequencing. Performed the RNA extraction of all CSTR samples for RNA sequencing.
- Established the bioinformatics pipeline for processing and analyzing the CSTR samples (mixed-species samples). Processed and analyzed the RNA sequencing data (Figure 5).
- Wrote and made figures for the manuscript.

Rory L. Williams

- Performed preliminary plate reader experiments testing state switching with BT/KP and BT/E. coli that determined we would use KP in CSTR experiments
- Established the CSTR workflow, optimized media conditions, and performed the CSTR experiments with help from TK (Figure 3).
- Designed CSTR experiments with TK.
- Worked with Nathan Dalleska to optimize HPLC for the measurement of SCFAs in CSTR samples.
- Performed qPCR of the CSTR samples (Figure 3).
- Characterized some of the Michaelis Menton constants used in the mathematical models. This was done through batch experiments for growth of Bt and Kp on various substrates and Bayesian parameter inference.
- Helped TK in preparing the manuscript.

Said R. Bogatyrev

- Hypothesis ideation with TK.
- Designed and performed preliminary experiments with TK: evaluating *Kp-Bt* community growth in batch culture as a function of substrate concentration, selectivity, and redox potential in the system.
- Performed statistical analysis