

Description of Additional Supplementary Files

Supplementary Dataset 1

`./rawdata\_experiment/` contains code and data files to reproduce all figures about experimental results (including predictions). Run `figs\_experiment.ipynb` for plotting the figures. Data files for each figure are listed below.

- * Fig.1c - SL_comp_cfu.xlsx
- * Fig.1d - CM_comp_cfu.xlsx
- * Fig.2c,d - SL_inv_OD.xlsx
- * Fig.2e - CM_inv_luc.xlsx
- * Fig.3b - SL_comp_cfu.xlsx (i, ii, iii), SL_inv_OD.xlsx (iii)
- * Fig.3c - CM_comp_cfu.xlsx (i, ii, iii), CM_inv_luc.xlsx (iii)
- * Sup Fig.1a - SL_pH.xlsx
- * Sup Fig.1b,c - SL_growth_diffpH.csv (the growth curve, with a "Sample Layout" section within the file), SL_growth_diffpH_inipH.csv (the initial pH of the media)
- * Sup Fig.2b - CM_comm_stability.xlsx
- * Sup Fig.2c - CM_pH.xlsx
- * Sup Fig.2d - CM_OD.csv
- * Sup Fig.3 - SL_comp_cfu.xlsx
- * Sup Fig.4 - CM_comp_cfu.xlsx
- * Sup Fig.5 - SL_mig_CFU_timeseries_40mM.xlsx
- * Sup Fig.6 - SL_inv_OD.xlsx
- * Sup Fig.7 - CM_inv_luc.xlsx
- * Sup Fig.8 - SL_comp_cfu.xlsx
- * Sup Fig.9 - CM_comp_cfu.xlsx

Note: for the sequencing and the simulated results as below, the raw data are available only in [Figshare](<https://doi.org/10.6084/m9.figshare.27168834>) due to large size

`./raw\_16S\_sequencing/` contains raw Illumina sequencing files and the bash script for generating the read count table in `./rawdata\_experiment/`.

`./rawdata\_simulations/` contains code and data files to reproduce all figures about simulation results. Run `figs\_simulations.ipynb` for plotting the figures. Processed data are available in `pickle` format in `./cr/` for Consumer-resource models and `./lv/` for Lotka-Volterra models. The raw simulation data are not necessary for reproducing the figures and are not provided due to their large size, but could be locally generated by running first `main\_simulations.py` then `analysis.py`. See `./rawdata\_simulations/readme\_simulations.md` for details.

* Fig. 4

* Sup Fig.10-19