

Data from: Microbiome interactions shape host fitness

Gould, Alison L., University of California, Berkeley

Zhang, Vivian, University of California, Berkeley

Lamberti, Lisa, Swiss Federal Institute of Technology in Zurich

Jones, Eric W., University of California, Santa Barbara

Obadia, Benjamin, University of California, Berkeley

Korasidis, Nikolaos, Swiss Federal Institute of Technology in Zurich

Gavryushkin, Alex, Swiss Federal Institute of Technology in Zurich

Carlson, Jean M., University of California, Santa Barbara

Beerenwinkel, Niko, Swiss Federal Institute of Technology in Zurich

Ludington, William B., University of California, Berkeley

Publication date: December 4, 2018

Publisher: Dryad

<https://doi.org/10.5061/dryad.2sr6316>

Citation

Gould, Alison L. et al. (2018), Data from: Microbiome interactions shape host fitness, Dryad, Dataset, <https://doi.org/10.5061/dryad.2sr6316>

Abstract

Gut bacteria can affect key aspects of host fitness, such as development, fecundity, and lifespan, while the host, in turn, shapes the gut microbiome. However, it is unclear to what extent individual species versus community interactions within the microbiome are linked to host fitness. Here, we combinatorially dissect the natural microbiome of *Drosophila melanogaster* and reveal that interactions between bacteria shape host fitness through life history tradeoffs. Empirically, we made germ-free flies colonized with each possible combination of the five core species of fly gut bacteria. We measured the resulting bacterial community abundances and fly fitness traits, including development, reproduction, and lifespan. The fly gut promoted bacterial diversity, which, in turn, accelerated development, reproduction, and aging: Flies that reproduced more died sooner. From these measurements, we calculated the impact of bacterial interactions on fly fitness by adapting the mathematics of genetic epistasis to the microbiome. Development and fecundity converged with higher diversity, suggesting minimal dependence on

interactions. However, host lifespan and microbiome abundances were highly dependent on interactions between bacterial species. Higher-order interactions (involving three, four, and five species) occurred in 13–44% of possible cases depending on the trait, with the same interactions affecting multiple traits, a reflection of the life history tradeoff. Overall, we found these interactions were frequently context-dependent and often had the same magnitude as individual species themselves, indicating that the interactions can be as important as the individual species in gut microbiomes.

Usage Notes

Development Data

Raw development time data for *Drosophila melanogaster* raised with all possible combinations of the five gut bacterial species examined in this study.

DevelopmentData.csv

Daily Fecundity Data

Raw daily fecundity data for *Drosophila melanogaster* raised with all possible combinations of the five gut bacterial species examined in this study.

DailyFecundityData.csv

Survival Data

Raw survival data for *Drosophila melanogaster* raised with all possible combinations of the five gut bacterial species examined in this study.

SurvivalData.csv

Fly Gut CFU Data

Raw bacterial load data for the guts of *Drosophila melanogaster* raised with all possible combinations of the five gut bacterial species examined in this study.

FlygutCFUsData.csv

Development Time Data Under Different Conditions

Development time data for *Drosophila melanogaster* under different experimental conditions and fed various combinations of five species of gut bacteria.

DevelopmentData_CompareMethods.csv

Survival Data for Antibiotic Treatments

Female survival data for *Drosophila melanogaster* under different experimental conditions and fed various combinations of five species of gut bacteria.

FemaleSurvivalData_AntibioticTreatments.csv

Fecundity Data for Antibiotic Treatments

Fecundity data for *Drosophila melanogaster* under different experimental conditions and fed various combinations of five species of gut bacteria.

FecundityData_AntibioticTreatments.csv

Summary of Bacteria Treatments

Reference table of the gut bacteria treatments used in this study. The 32 treatments listed include all possible combinations of the 5 species of gut bacteria examined in this study.

TreatmentSummary.csv

Data Files

Download dataset

› December 4, 2018

Related Works

Article

<https://doi.org/10.1073/pnas.1809349115>

Metrics



257 views



62 downloads



1 citations

Keywords

epistasis

fitness landscape

microbial ecology

species diversity

License

This work is licensed under a CC0 1.0 Universal (CC0 1.0) Public Domain Dedication license.



[Privacy Policy](#) [Accessibility Policy](#) [Terms of Service](#)



[Follow us on Twitter](#)



[Check out our Blog](#)

Copyright (c) 2021 Dryad