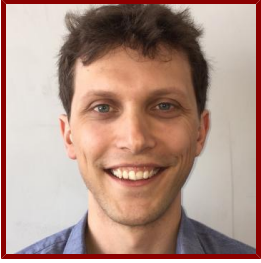


Stanford



Benjamin Good

Assistant Professor of Applied Physics and, by courtesy, of Biology

Bio

BIO

Benjamin Good is a theoretical biophysicist with a background in experimental evolution and population genetics. He is interested in the short-term evolutionary dynamics that emerge in rapidly evolving microbial populations like the gut microbiome. Technological advances are revolutionizing our ability to peer into these evolving ecosystems, providing us with an increasingly detailed catalog of their component species, genes, and pathways. Yet a vast gap still remains in understanding the population-level processes that control their emergent structure and function. Our group uses tools from statistical physics, population genetics, and computational biology to understand how microscopic growth processes and genome dynamics at the single cell level give rise to the collective behaviors that can be observed at the population level. Projects range from basic theoretical investigations of non-equilibrium processes in microbial evolution and ecology, to the development of new computational tools for measuring these processes in situ in both natural and experimental microbial communities. Through these specific examples, we seek to uncover unifying theoretical principles that could help us understand, forecast, and eventually control the ecological and evolutionary dynamics that take place in these diverse scenarios.

ACADEMIC APPOINTMENTS

- Assistant Professor, Applied Physics
- Assistant Professor (By courtesy), Biology
- Member, Bio-X

HONORS AND AWARDS

- Chan Zuckerberg Biohub Investigator Award, Chan Zuckerberg Biohub (2022-2027)
- Alfred P. Sloan Research Fellowship, Alfred P. Sloan Foundation (2021-2023)
- Terman Fellowship, Stanford University (2019)
- Miller Research Fellowship, Miller Institute for Basic Research in Science (2016-2019)

PROFESSIONAL EDUCATION

- Ph. D., Harvard University , Physics (2016)
- B.A., Swarthmore College , Physics/Mathematics (2010)

LINKS

- Research group website: <https://bgoodlab.github.io>

Teaching

COURSES

2022-23

- Introduction to Biophysics: APPPHYS 205, BIO 126, BIO 226 (Win)

2021-22

- Introduction to Biophysics: APPPHYS 205 (Win)

2020-21

- Introduction to Biophysics: APPPHYS 205, BIO 126, BIO 226 (Spr)
- Quantitative Evolutionary Dynamics and Genomics: APPPHYS 237, BIO 251 (Win)

2019-20

- Quantitative Evolutionary Dynamics and Genomics: APPPHYS 237, BIO 251 (Win)

STANFORD ADVISEES

Doctoral Dissertation Reader (AC)

Brandon Benson, Vivian Chen, Sarah Harvey, Dylan Maghini, Alana Papula, Grace Woods

Doctoral Dissertation Advisor (AC)

James Ferrare, Olivia Ghosh, Zhiru Liu, Anastasia Lyulina, John McEnany, Daniel Wong

Doctoral Dissertation Co-Advisor (AC)

Anita Kulkarni, Sophie Walton

Postdoctoral Research Mentor

Jaime Lopez

Publications

PUBLICATIONS

- **Linkage disequilibrium between rare mutations.** *Genetics*
Good, B. H.
2022
- **Eco-evolutionary feedbacks in the human gut microbiome**
Good, B. H., Rosenfeld, L. B.
biorxiv.
2022
- **Quantifying the Adaptive Potential of a Nascent Bacterial Community**
Ascensao, J. A., Wetmore, K. M., Good, B. H., Arkin, A. P., Hallatschek, O.
biorxiv.
2022
- **Quantifying rapid bacterial evolution and transmission within the mouse intestine.** *Cell host & microbe*
Vasquez, K. S., Willis, L., Cira, N. J., Ng, K. M., Pedro, M. F., Aranda-Diaz, A., Rajendram, M., Yu, F. B., Higginbottom, S. K., Neff, N., Sherlock, G., Xavier, K. B., Quake, et al
2021
- **Longitudinal linked-read sequencing reveals ecological and evolutionary responses of a human gut microbiome during antibiotic treatment.** *Genome research*

Roodgar, M., Good, B. H., Garud, N. R., Martis, S., Avula, M., Zhou, W., Lancaster, S. M., Lee, H., Babveyh, A., Nesamoney, S., Pollard, K. S., Snyder, M. P.
2021

- **Competition for fluctuating resources reproduces statistics of species abundance over time across wide-ranging microbiotas**
Ho, P., Good, B. H., Huang, K. C.
biorxiv.
2021
- **Emergent evolutionary forces in spatial models of microbial growth in the human gut microbiota**
Ghosh, O. M., Good, B. H.
biorxiv.
2021
- **Population genetics of polymorphism and divergence in rapidly evolving populations**
Melissa, M. J., Good, B. H., Fisher, D. S., Desai, M. M.
biorxiv.
2021
- **Evolutionary dynamics of bacteria in the gut microbiome within and across hosts.** *PLoS biology*
Garud, N. R., Good, B. H., Hallatschek, O., Pollard, K. S.
2019; 17 (1): e3000102
- **Adaptation limits ecological diversification and promotes ecological tinkering during the competition for substitutable resources** *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA*
Good, B. H., Martis, S., Hallatschek, O.
2018; 115 (44): E10407–E10416
- **Effective models and the search for quantitative principles in microbial evolution** *CURRENT OPINION IN MICROBIOLOGY*
Good, B. H., Hallatschek, O.
2018; 45: 203–12
- **The Effect of Strong Purifying Selection on Genetic Diversity** *GENETICS*
Cvijovic, I., Good, B. H., Desai, M. M.
2018; 209 (4): 1235–78
- **The dynamics of molecular evolution over 60,000 generations** *NATURE*
Good, B. H., McDonald, M. J., Barrick, J. E., Lenski, R. E., Desai, M. M.
2017; 551 (7678): 45–+
- **Evolution of Mutation Rates in Rapidly Adapting Asexual Populations** *GENETICS*
Good, B. H., Desai, M. M.
2016; 204 (3): 1249–66
- **Fate of a mutation in a fluctuating environment** *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA*
Cvijovic, I., Good, B. H., Jerison, E. R., Desai, M. M.
2015; 112 (36): E5021–E5028
- **The Evolutionarily Stable Distribution of Fitness Effects** *GENETICS*
Rice, D. P., Good, B. H., Desai, M. M.
2015; 200 (1): 321–U599
- **The Impact of Macroscopic Epistasis on Long-Term Evolutionary Dynamics** *GENETICS*
Good, B. H., Desai, M. M.
2015; 199 (1): 177–U639
- **Deleterious Passengers in Adapting Populations** *GENETICS*
Good, B. H., Desai, M. M.
2014; 198 (3): 1183–1208
- **The Fates of Mutant Lineages and the Distribution of Fitness Effects of Beneficial Mutations in Laboratory Budding Yeast Populations** *GENETICS*

Frenkel, E. M., Good, B. H., Desai, M. M.

2014; 196 (4): 1217-+

● **Genetic Diversity in the Interference Selection Limit** *PLOS GENETICS*

Good, B. H., Walczak, A. M., Neher, R. A., Desai, M. M.

2014; 10 (3): e1004222

● **Fluctuations in fitness distributions and the effects of weak linked selection on sequence evolution** *THEORETICAL POPULATION BIOLOGY*

Good, B. H., Desai, M. M.

2013; 85: 86–102

● **Distribution of fixed beneficial mutations and the rate of adaptation in asexual populations** *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA*

Good, B. H., Rouzine, I. M., Balick, D. J., Hallatschek, O., Desai, M. M.

2012; 109 (13): 4950–55

● **Performance of modularity maximization in practical contexts** *PHYSICAL REVIEW E*

Good, B. H., de Montjoye, Y., Clauset, A.

2010; 81 (4): 046106