



Channing Microbiome Seminar

March 1 (Friday), 2019, 11am @ 5th-floor conference room



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Predicting the assembly of complex communities in simple environments

Abstract: Microbes form complex multi-species communities that play important roles across the biosphere. Metabolism is a major determinant of microbial community assembly, but a quantitative and predictive connection between nutrient availability and the composition of microbial communities is lacking. Can we possibly predict which communities will form in a given, known nutrient environment? We have addressed this question through a combination of metabolic modeling and quantitative experiments. Experimentally, we have followed a high-throughput "enrichment-culture" approach to cultivate large numbers of natural communities in synthetic environments with a defined nutrient composition. Our experiments indicate that community assembly in replicate environments follows simple and reproducible metabolic rules, despite substantial species-level variability. Explicit, quantitative metabolic models allow us to predict the assembly of communities in novel nutrients, suggesting that the relationship between nutrient composition and microbiome assembly can be explained from first principles.

Brief Bio: Alvaro is an Assistant Professor in the Department of Ecology & Evolutionary Biology and the Microbial Sciences Institute at Yale. He is originally from Zamora, Spain, and got his Undergraduate degree in Theoretical Physics at the Universidad Autonoma de Madrid. Following that, he got a M.Sc. in Physics at the University of Minnesota, and a PhD in Biophysics & Quantitative Biology at Brandeis University in Waltham, MA. After his PhD, he joined the laboratory of Jeff Gore at MIT as a postdoctoral fellow, where he studied the eco-evolutionary dynamics of social genes in microbial populations. He then moved to the Rowland Institute at Harvard as a Junior Fellow, and three years later he moved to Yale's West Campus where he started his group in the summer of 2016. His lab investigates whether (and how) we can quantitatively predict microbial evolution and microbial community assembly.

Hosted by Yang-Yu Liu