



Channing Microbiome Seminar

June 8th (Friday), 2018, 11am @ 5th-floor conference room



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Microbial enzymatic strategies shape community assembly on particulate carbohydrates

Abstract: Microbial degradation of particulate carbohydrates to low molecular weight oligosaccharides is essential process to maintain health and function of many microbial ecological niches ranging from human to soil and ocean. While biochemistry of hydrolytic enzymes is well studied, the major challenge still remains on understanding the ecological relevance of microbial enzymatic strategies on shaping community structure and resource acquisition from such insoluble biopolymers. We develop agent based models that simulate functional traits of individual cells and combined with diffusion-reaction processes for exoenzymes and oligosaccharides explicitly link the cell behavior to their immediate environment (structure and local chemical gradients) where community level function emerges. We demonstrate how variations in individual cell functional traits such as dispersal strategy (motility: chemotaxis vs. random walk and attachment/detachment behavior) shape community assembly and resource acquisition from such insoluble biopolymers. The study reveals that complex microbial patterns emerged on biopolymers could be explained by surprisingly simple rules driven by individual cell's growth kinetics and trade-offs between affinity to substrate and biopolymer's quality.

Bio: Ali Ebrahimi is a postdoctoral fellow at the Parsons lab of MIT, with special interests in the areas of microbial ecology and computational physics. He explores the roles of chemical and physical constraints on microbial functioning and community structure. Ali received his MSc in Chemical Engineering from Sharif University of Technology (Tehran, Iran). He completed his PhD at ETH Zurich focusing on developing mechanistic models for microbial activity in soil based on pore network models coupled with individual based approaches. He is recipient of Early PostDoc Mobility Fellowship from Swiss National Science Foundation.

Hosted by Yang-Yu Liu