

Seminar

Monday, April 24, 2017

10:00 AM – 206 Furnas Hall

Ali R Zomorodi

Boston University

*Deciphering the games microbes play at
genomic resolution*

Microbes often secrete or leak metabolites that can be used by other microbes in a community. These metabolic exchanges can generate complex networks of inter-species dependencies that contribute to the community composition, diversity and stability. Gaining a mechanistic understanding of how these inter-species interactions arise and subsist in natural microbial communities is a key step toward understanding the impact of these communities on the health of the human host. We combine genome-scale models of metabolism with evolutionary game theory to quantitatively assess, at unprecedented throughput and genomic resolution, how these interactions arise and vary across organisms and exchanged metabolites. We first validated this approach using data on sucrose hydrolysis by *S. cerevisiae*. Next, we performed over 80,000 in silico experiments to systematically evaluate the rise of unidirectional or bidirectional metabolic dependencies in populations of *Escherichia coli* secreting 189 pairs of amino acids at various levels. Our results suggest that the interactions among metabolic pathways underlying the exchanged amino acids play a key role in shaping the form of metabolic dependencies. Overall, this study lays the foundation for characterizing the impact of microbe- microbe, host-microbiota and host-pathogen interactions on the human health and disease and for systematically designing therapeutic interventions.

Refreshments at 10:45



University at Buffalo

Department of Chemical
and Biological Engineering

School of Engineering and Applied Sciences