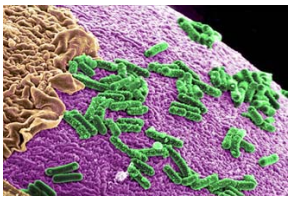
Systems Biology Approaches to Microbiome Research
(Microbiome ARC)

For monthly ARC meeting dates and times, please contact the directors.

ARC Leadership:
Daniel Segrè, ARC Co-Director, Ph.D., Associate Provost for Graduate Affairs, Professor, Bioinformatics

Evan Johnson, ARC Co-Director, Ph.D., Associate Professor, Computational Biomedicine



For more information visit:
http://www.bumc.bu.edu/evanscenteribr/the-arcs/

The population of microbes living in and on a person is called the human microbiome. Changes in gut microbes-like those pictured here-have been associated with colon cancer, type 2 diabetes, and even Alzheimer's disease. Photo courtesy of Pacific Northwest National Laboratory. *(for full article and references, see: http://www.bu.edu/eng/2016/05/17/microbiome/)*

The primary goal of this ARC is to develop a new, multi-level mechanistic understanding of how microbe-microbe, microbe-environment, and microbe-host interactions determine microbial community dynamics, diversity and stability, and use this knowledge to understand how to control and engineer microbial communities for defined purposes. We are combining systems biology models of metabolic networks, physics-based theory of ecosystem dynamics, experimental studies of molecular-level processes, and microbial community data analysis. We are pursuing the development of a suite of computational tools that will constitute a core resource for multiple BU investigators. This "Microbiome Junction" will serve as the point of convergence of multiple data types generated by different investigators, and provide a set of computational analyses that will help investigators characterize the microbial interaction networks present in their biosamples. Our current core team involves expertise in microbial genomics, metagenomics and bioinformatics (Johnson), systems biology of microbial metabolism (Segrè), biophysical models of microbial dynamics and evolution (Mehta, Korolev), the role of microbiome in human disease (Chitalia), and experimental microbial ecology (Talbot).

The ARC continues to serve as a focus for microbiome-related activities at BU. The unique combination of data processing capabilities and the biophysics-based search for fundamental principles of microbial community dynamics is relevant for the numerous ARC researchers involved in biogeochemistry and climate change research, facilitating a broad dialogue, at BU and beyond, on the impact of microbial ecosystems on human life.

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