Biology Seminar

12:30 - 1:30 pm
Friday, February 17, 2023
BGS 0165

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For better or worse, we can change microbes quickly

Niche breadth shapes bacterial biogeography and largely determines the success or failure of probiotics. In agriculture, the in-field survival and performance of soil probiotics has been unpredictable since they were first marketed in the 1800s, making it hard to integrate them into agricultural practice. While bacteria that enhance plant-promoting functions (e.g. phosphorus solubilization) are easy to capture, their in-field survival depends on compatibility between the receiving environment and the niche breadth of introduced bacteria. Our group uses a range of approaches to try and modify in-soil microbial fitness, often centering on directed evolution in complex environments. While most directed evolution experiments isolate single environmental variables (e.g. temperature), in-field survival requires microbes to contend with many variables at once. Our approach is to replicate this complexity during microbial conditioning, both in the lab, using soil microcosms, and in the field, using novel adaptation chips that let bacteria interface with soil through membrane filters. We combine soil and microbiological techniques with “evolve and resequence” approaches, including whole genome sequencing, population sequencing, and soil metagenomics. In this talk, I will focus on what we’ve learned so far about the potential for and predictability of bacterial niche breadth modification.

Western Biology