

Title: High-throughput testing of carbon source on microbial community assembly and antibiotic production

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Project Goals: Utilize a high-throughput culture-based approach to more easily understand ecological constraints that affect microbial community structure. Specifically these experiments aim to identify how selective pressures of carbon resource type and diversity contributed to changes in community structures.

Abstract: We are working with 12 isolates of *Pseudomonas* spp., the most common isolates from ENIGMA studies at the Oakridge Field Research Center. This synthetic community provides a system to understand how environmental conditions affect community assembly and how closely related species interact with each other. Typically, closely related microbial species inhabit similar ecological niches and will inhibit the growth and survival of each other as they compete for the same resources. *Pseudomonas* are known to produce bacteriocins, which inhibit closely related strains and species, and other toxic small molecules, such as phenazines.

We are testing the effect of 96 carbon sources on the structure of our synthetic community in regards to (1) growth on selective carbon sources and (2) antibiotic production. Carbon sources, such as sugars, have been demonstrated to regulate antibiotic production in various bacterial species, including *Pseudomonas* species. We report our initial results on identifying selective carbon sources for growth and carbon sources that induce microbes to produce inhibitory compounds. We are also using a new microfluidics method developed in our lab to help determine genes important for species interactions in these conditions. In the future we can apply these same methods to study other ENIGMA isolates and the effects of other substrates and conditions such as metal ions, nutrient levels, and proportions of nutrients on community assembly.