

# Biology Seminar

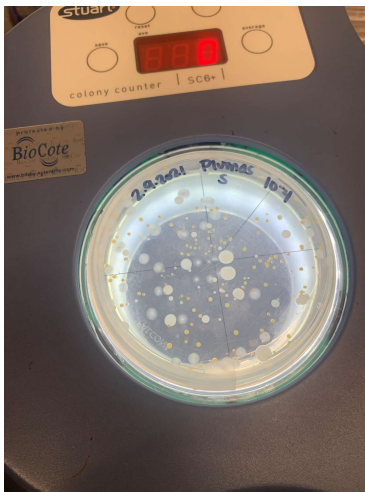
Speaker: Allie Igwe, Ph.D.

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## Investigating the Diversity and Function of Microorganisms in Serpentine and Non-Serpentine Soils across California

Monday May 20, 2024 | 12:00PM PDT | HCK 132



Serpentine soils, characterized by high heavy metal levels and magnesium-to-calcium ratios, exert selective pressure on plants and microorganisms. While some plants are endemic to these soils, most struggle to survive. Our research revealed that serpentine-indifferent plants, thriving on both serpentine and non-serpentine soils, may be sustained by their association with locally adapted plant growth-promoting bacteria. The role of microorganisms in supporting plant diversity and ecosystem services is being explored, and characterizing taxonomic and functional microbe diversity on and off serpentine soils is crucial.

Our project aimed to identify taxa associated with serpentine or nonserpentine soils, characterizing microorganisms' plant-growth-promoting properties across California. Shotgun metagenomic sequencing and physiological assays were conducted on soil samples from paired sites. Kaiju and MEGAN6 were used for taxonomic classification and functional analysis.

After removing contaminants, 41,326 taxa were identified, with similar abundance and alpha diversity across serpentine and nonserpentine soils. Soil chemistry and location significantly shaped bacterial and eukaryotic communities, not archaeal ones. Random forest analysis highlighted features like Mesorhizobium, Rhizobium, and Pontibacter in nonserpentine soils and Nitrososphaera and Pontibacter in serpentine soils. Preliminary functional analysis showed the 3 clusters explained 86.6% of the functional variance. Random forest analysis showed changes in energy production and conversion, carbohydrate transport and metabolism, and cell wall/membrane/envelope biogenesis as well as other functions defined the features of the clusters. This information can be used to explore the role of these functions in microbial soil stress tolerance and expand the defining features of plant growth-promoting bacteria.

Seminar Speaker Host: Andrea Durant

