Isolation and Characterization of Diverse Microorganisms Involved in Carbon Recycling

Jasmine Amaya1 2, Brandon Enalls3, Mariam Alsaid2 4, Romy Chakraborty2,3
1Diablo Valley College, 22022 Transfer-to-Excellence Research Experiences for Undergraduates Program (TTE REU Program), 3Department of Biology, Lawrence Berkeley National Lab, 4College of Natural Resources, UC Berkeley

Abstract

In previous works, we were able to culture a wider variety of microbes using these naturally occurring carbon sources. We expand upon this work by continuing to isolate and characterize microbes that can use microbial necromass as a carbon and energy source. To accomplish this, we are enriching the microbes in solid media using bacterial cell lysates that will simulate necromass found in nature. We can then extract and sequence the DNA from these isolates, allowing us to give them taxonomic assignments. The collection of isolated microbes are likely involved in recycling biological material in their native environments, highlighting their contribution to the carbon cycle.

Background

- Microbes are among the most abundant life forms found on the planet [1].
- 70% remain uncultured, thus, their physiologies and ecological impacts remain largely mysterious [2].
- Culturing microbes in a laboratory setting is vital to understand their metabolism and how they obtain energy from the environment.
- Chakraborty group developed successful cultivation techniques to culture diverse subsurface microorganisms and complex carbon sources that are effective with encouraging the growth of diverse bacteria [3].
- Building upon prior research, this research project continues isolating and characterizing microbes using microbial necromass as a carbon source from sediment samples.
- Results help us identify the microbes that may be vital to carbon recycling in natural environments.

Methods

- On the third transfer streak, the colony’s form, consistency, and color were documented. The most commonly seen colony had a circular form, moist consistency, and white or clear color.
- R2A media produces more diversity in microbes that consume necromass compared to 1/10 R2A and RCH2.
- Detected most often were the Bacillus sp. strain HY4 on 1/10 R2A and the Bacillus veiseiensis strain ZT-2 on 1/10 R2A and RCH2 media.

Results

- Twenty-six of the isolates were members of the genus Bacillus.
- We isolated two Bacillus strains and a Streptomyces bungoensis strain from RCH2 media using only necromass as a carbon source. This indicates that these strains likely contribute to carbon recycling.
- To further our research, we can attempt to grow all of our isolates on RCH2 proving that the microbes isolated are only consuming the necromass instead of nutrients from the more nutrient rich media.

Conclusions

- Out of thirty-six isolates, seven different genera were found from our one sediment sample.
- Twenty-six of the isolates were members of the genus Bacillus.
- We isolated two Bacillus strains and a Streptomyces bungoensis strain from RCH2 media using only necromass as a carbon source. This indicates that these strains likely contribute to carbon recycling.
- To further our research, we can attempt to grow all of our isolates on RCH2 proving that the microbes isolated are only consuming the necromass instead of nutrients from the more nutrient rich media.

Contact Information

Jasmine Amaya
jasninaamaya@gmail.com

References