CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s)
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Project Number
28320

Project Title
The Advantage of Evolutionary Democracy: How Microorganisms Could Save Man's World

Abstract

Objectives/Goals
The objective of this experiment is to identify which, if any, inorganic nutrient can be added to the environment of naturally occurring petrophilic (oil-degrading) microbes (namely a fungal strain, Penicillium; and a bacterial strain, Pseudomonas) in order to induce an increase in the rate at which oil spills in the ocean can be efficiently cleaned up.

Methods/Materials
Methods undergone during experiment include: 1) growing bacterial/fungal cultures; 2) introducing a set volume of oil and one of seven inorganic variables into an erlenmyer flask isolated for each strain; 3) allowing each separate experimental setup rest under simulated conditions characteristic of the ocean surface (i.e. artificial light source providing visible light spectrum, orbital shaker to simulate wave motion) for three days, after which a light spectroscopy was conducted on each flask in order to assay the relative rate at which oil was degraded; and finally, 4) comparing the light spectroscopy readings between variables against 10 controls to conclude best "accelerator."

Results
After a three day period of inorganic nutrient present in the oil slick environment of these naturally occurring oil-degrading microbial populations, urea yielded the highest average percent increase in transmission of 49 percent.

Conclusions/Discussion
The fact that urea (a compound often seen in biology as the excretory compound of nitrogenous waste from the hydrolysis of proteins) yielded the greatest increase in average percent transmission may offer greater insight into the metabolism of these petrophilic microbes, which is ultimately a scientific goal of this experiment. The results not only support my hypothesis that an inorganic nutrient bearing a relatively high percent of fixed nitrogen would act as the greatest accelerating compound, but also provoke intrigue regarding the use of microorganisms for the bioremediation of oil spills in order to preserve the photosynthetic activity of the euphotic zone and fragile marine ecological systems in environmental control.

Summary Statement
Accelerating the rate of oil spill bioremediation via the introduction of inorganic nutrients to the environment of oleophilic microbial populations.

Help Received
Use of lab equipment under supervision of Wayne Garabedian, biology teacher at Clovis West High School. (Note: complete experiment conducted in a high school laboratory).