



**CALIFORNIA STATE SCIENCE FAIR  
2003 PROJECT SUMMARY**

<b>Name(s)</b> Paul A. Westhart	<b>Project Number</b> <b>S0814</b>
<b>Project Title</b> <b>The Effect of a Biopreparation on Oil Degrading Microbes under Low Temperature</b>	
<b>Abstract</b> <b>Objectives/Goals</b> The objective of my experiment is to determine if the oil degrading activity of Pseudomonas bacteria in colder climates, like Alaska, can be enhanced by the introduction of a biopreparation. A biopreparation is a compound of naturally occurring bacteria and enzymes used to bioremediate hydrocarbons. <b>Methods/Materials</b> Place 100 mL of distilled water, 30 drops of refined oil and 0.5 g of nutrients into 12 jars. Inoculate 3 jars with 7 mL of Pseudomonas culture, 3 jars with 0.01 g of biopreparation and 3 jars with 6 mL of Pseudomonas culture and 0.01 g of biopreparation. The last 3 jars are the control jars and they contain no microbes. Separate the 12 jars into 3 identical groups. Each group will have one type of jar plus a control jar. Incubate one group of jars at 7 C, another group at 15 C and the third group at 30 C for six weeks. Measure the rate of oil degradation in the jars every five days using the scale of oil degradation. Measure the change in the pH of the jars weekly. Count the bacteria in each jar three times by using dilutions and plating out procedures. Use HPLC Columns chromatography to analyze the different compounds in each jar. Repeat the experiment twice. <b>Results</b> The oil degrading activity of Pseudomonas mixed with the biopreparation (mix) was higher than the other jars at 7 C: The change in the bacterial population of the mix was $20 \times 10^6$ compared to $16 \times 10^6$ for Pseudomonas alone and $13 \times 10^6$ for the biopreparation alone. The decrease in the pH of the mix was 0.2 compared to 0.1 for Pseudomonas and 0.1 for the biopreparation. HPLC results revealed a greater number of peaks and peak area in the chromatograms of the mix samples when compared to the chromatograms of the Pseudomonas samples and the biopreparation samples. There was no oil degradation evidenced in the control jars. <b>Conclusions/Discussion</b> The results support the hypothesis that a biopreparation can enhance the oil degrading activity of Pseudomonas at low temperatures. Bioremediation using biopreparations as enhancing agents could possibly help clean oil spills in cold waters such as the Exxon Valdez spill in Alaska. More testing, a larger number of samples and knowledge about the ecosystems in the contaminated area would be needed before the application of in-situ bioremediation using biopreparations.	
<b>Summary Statement</b> My project tests the effect of a biopreparation on the bioremediation of oil spills in cold water.	
<b>Help Received</b> My parents helped me obtain the materials necessary for the experiment. Dr. Gardiner and Dr. Grun from the School of Biological Sciences at UCI allowed me to use the university's HPLC equipment under their supervision. They also helped me analyse the chromatograms.	