On Land or by Sea Oil Eating Bacteria Part V

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Oil spills in the environment pose a significant risk to both the environment and the ecosystem. This science fair project has explored the possibilities of finding and characterizing oil-degrading bacteria from the desert southwest and using these bacteria for degrading oil on ocean surfaces and roadways. Bacterial isolates in the desert southwest were found that successfully utilized oil as a carbon source over simulated ocean water. The focus of this year's project was to monitor the degradation of oil on a solid concrete surface by the bacteria. The use of a Gas Chromatography/Differential Mobility Spectrometry (GC/DMS) as a means to monitor oil degradation was explored. GC/DMS is a method of analyzing the air above the sample for various volatile chemical compounds. GC/DMS can be utilized as a remote sensor as it is portable and does not have large power requirements. Oil degrading bacteria, including Methylobacterium sp. and Bacillus nealsonii isolated from the desert southwest, were introduced to concrete spiked with motor oil. The GC/DMS was used to periodically sample the air above the samples. Over time, aromatic and aliphatic hydrocarbons were consumed by the bacteria as was evidenced by the increased response of unique metabolite signals by the GC/DMS. The data shows that bacteria effectively degrade oil on a solid surface and can be used to remediate a terrestrial oil spill. GC/DMS can detect volatile chemical species produced by bacterial action. This study also indicated that GC/DMS could also detect and differentiate bacterial species. The bacteria are degrading hydrocarbons as a source of carbon in a non-aqueous environment and could be used to clean up an oil spill on a roadway.

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