Heterocyclic compounds degradation of newly isolated Antarctic soil bacteria

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Contamination of soil or sea from oil and related compounds is a serious environmental problem. Oil contains heterocyclic compounds such as carbazole (CAR), dibenzothiophene (DBT) and dibenzofuran (DBF) which are persistent and harmful for the ecosystems. Bioremediation provides a potential solution to detoxify these contaminants. When compared to other approaches, bioremediation may be the best solution to date. These are numerous reports on bioremediation of CAR in general, but very few involving cold adapted bacteria. Polar regions have very low temperatures and only microbes with ability to survive in the extreme cold temperature can be effective for bioremediation. Antarctic psychrophilic bacteria and cold adapted bacteria have potential to degrade contaminants at low temperatures and are very promising for development of bioremediation for cold regions. The application of bioremediation in Antarctica requires the use of bacteria present in Antarctica by the Antarctic Treaty System (ATS). Therefore, it requires for bioremediation study using native Antarctic bacteria. The objective of this study is to isolate more bacteria strains with ability to degrade heterocyclic compounds for future development of bioreactor-based bioremediation solution for Antarctica.

In addition to previous study, bacteria strains were newly isolated from soil samples obtained from King George Island, Antarctica. Enriched culture used Minimal Salt Medium (MSM) contains 0.1% DBF as the sole source of carbon during isolation stages. Temperature was set to 15 ºC. Isolates were identified through sequencing of 16S rRNA gene. Degradation performance analysis using heterocyclic compounds carbazole (CAR), dibenzothiophene (DBT) and dibenzofuran (DBF) were conducted at 15 ºC. Measurements of residual heterocyclic compounds were performed using GC-FID. Results showed promising performance for degrading heterocyclic compounds at low temperatures. Further study on these bacterial strains are required for further development of bioremediation solution for cold environments.