Characterization of carbazole degrading bacteria from Antarctic soil

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Carbazole (CAR) is a heterocyclic compound that is in increasing demand as an industrial raw material for pharmaceuticals and plastics. It has been detected in petroleum-contaminated soil and seawater, along with their decomposition products. It has also been detected in Antarctica in recent years due to human activities. Since carbazole is persistent in nature and has been confirmed to be carcinogenic and mutagenic, it is necessary to remove the compound from the environment, but physical methods are costly and have secondary processing problems. Therefore, bioremediation approaches should be used to remove carbazole pollution as it is low cost to implement while being low impact on the environment. A number of studies have reported on the degradation of CAR using bacteria to be effective at relatively warm temperatures, but information on carbazole degrading bacteria from cold environments is limited. Environmental pollution occurs not only in warm climates but also in cold climates, hence there is a need to study and understand carbazole degrading bacteria in such environments. Furthermore, the Antarctic Treaty restricts the introduction of organisms from the outside world, bioremediation for Antarctic origin can only be conducted using native microbes. The objective of this study is to isolate and characterize CAR degrading bacteria from Antarctic soil for bioremediation in cold environments. Strains isolated for this study are designated as strain BS1,BS6,BS14,BS19,BS23 and BS28. These strains were isolated from soil near the Chile Base in Antarctica and isolated from the Antarctic soil by enrichment culture method. They were confirmed to have CAR-degrading ability by growth was confirmed with MSM containing 0.1% CAR as sole carbon source. Growth tests at temperatures ranging from 5-45°C showed that the strains BS1, BS6, BS14, BS19, BS 23 and BS28 grew only at 5-35°C. whereas E. coli (used as control) grew well at 20-45°C. This confirmed that these isolates can degrade CAR effectively at low temperatures. Future studies of BS1-BS28 strains will enhance our understanding and increase our knowledge on developing bioremediation measures for Antarctica and other cold climate environments.