Abstract

Isolation and Characterisation of Polycyclic Aromatic Hydrocarbon (PAH) degrading bacteria from the soils adjacent to the La Brea Pitch Lake Seepage

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The Polycyclic Aromatic Hydrocarbons (PAHs) are toxic, carcinogenic and genotoxic compounds which are a natural component of crude oil and natural oil seepages. The present study investigated the occurrence of five selected PAHs (*viz.* naphthalene, acenaphthene, anthracene, phenanthrene and pyrene) in soils neighbouring the La Brea Pitch Lake and the presence of specialized PAH degrading bacteria in these soils. Soil samples were obtained from three distance zones from the periphery of the Pitch Lake and analyzed for levels of PAHs and other physicochemical parameters. PAH degrading bacteria were also isolated using a selective enrichment procedure and the organisms were identified and characterized. The metabolic capability of the isolates in degrading five PAHs was also assessed.

The results showed the levels of most of the individual and total PAHs to be above the acceptable limits (<1 mg/Kg for individual PAHs and <40 mg/Kg for total PAHs), even in the outermost reference zone (> 500 m away from the Pitch Lake). A total of 69 strains were isolated capable of growing on PAH enriched minimal plates. *Burkholderia* sp. (61% of 59 PAH isolates) was the most prevalent followed by *Bacillus* sp., *Achromobacter* sp., *Leifsonia* sp., *Dyemonas* sp., *Pseudomonas* sp. and *Paenibacillus* sp. (26%, 5%, 2%, 2%, 2% and 2%, respectively). The

biochemical, physiological and morphological tests showed high diversity among the isolates (AH71 and AH75).

This was the first study that isolated culturable *Dyella* sp. (AH77) and *Leifsonia* sp. (AH86 and AH88) associated with the degradation of PAHs. Based on homology of partial 16S rRNA gene sequences, some of the isolates may be potentially new species including *Dyella* sp. (AH77), *Paenibacillus* sp. (AH51) and *Burkholderia* sp. (AH53 and AH87).

Keywords:

Polycyclic aromatic hydrocarbons (PAHs), naphthalene, acenaphthene, anthracene, phenanthrene, pyrene, PAH degraders, biodegradation, La Brea Pitch Lake.