

## ABSTRACT

### The Ecology of Hydrocarbon Degrading Bacteria at a Natural Oil Seep.

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The La Brea region in Trinidad is an area of extensive natural oil seepage that also contains the world's largest known asphalt lake. This study explored the abundance and distribution of indigenous microorganisms within an area of extensive natural oil seepage, in the marine environment at La Brea, Trinidad. Sampling a natural oil seep area provides an opportunity to test the hypothesis that an extensive continuous input of hydrocarbons into the marine environment over an evolutionary time period should result in the development of a benthic ecosystem with a significant oil degrading and oil tolerant population of microorganisms.

Sediment samples were collected during a wet and dry season from up to ten (10) stations that varied in exposure to anthropogenic hydrocarbons. Quantification of total bacteria was made using epifluorescence microscopy and Most Probable Number (MPN) analyses. Total polyaromatic hydrocarbon (PAH), organic carbon and sediment types were also determined at the various stations.

Areas immediately surrounding active petroleum seepage generally had higher numbers of bacteria than other areas. During the wet season, Nov. 1995, total bacterial numbers ranged from  $3.38 \times 10^9$  cells/g sediment, at an area of moderate hydrocarbon seepage (station 7), to  $0.786 \times 10^9$  cells/g sediment at the

largest petroleum seep (station 5). In the dry season, May 1996, total bacterial numbers ranged from  $0.749 \times 10^9$  cells /g sediment, at a moderate petroleum seep (station 1), to  $0.50 \times 10^9$  cells/g sediment at the most active seep station (station 5).

The fraction of the total heterotrophic bacteria in sediments represented by the hydrocarbon utilisers ranged from 2 to 100% in concordance with increasing exposure to petroleum. All bacteria at the most active oil seep were hydrocarbon utilisers. The majority of the other stations had values less than 20 % HCU bacteria.

This study shows that in La Brea seep sediments, the majority of hydrocarbon degrading bacteria, numerically and metabolically appear to correlate with the concentration of petroleum. The occurrence and numbers of the microbial hydrocarbon utilisers illustrate their ubiquity and persistence and thus indicates the microbial potential for removal or conversion of hydrocarbons in the environment examined.

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