PAH DEGRADATION EFFECTS OF SOME BACTERIA

Mine Cardak [1] *, Gulsen Altug [1], Pelin S. Ciftci [1] and Sevan Gurun [2]
[1] Istanbul University Faculty of Fisheries Department of Marine Biology Istanbul Turkey - mine_bio98@hotmail.com
[2] Istanbul University Science and Art Faculty Department of Biology Istanbul Turkey

Abstract
Escherichia coli, Bacillus subtilis, Pseudomonas aeruginosa, Vibrio fluvialis, Serratia marcescens, Klebsiella pneumoniae were isolated from seawater and refinery soil. The highest PAH (polycyclic aromatic hydrocarbons) degradation effect was observed in the mixed cultures of refinery isolates. PAH degradation effects had more impact on *V. fluvialis* and *K. pneumoniae* than on other sea water isolates.
Keywords : Bacteria, Black Sea, Petroleum.

Introduction
Marine environments offer abundant resources for research and development yet, the potential of this domain as the basis for new biotechnologies remains largely unexplored. Since hydrocarbons are natural products widely distributed in nature, it is not surprising that bacteria able to degrade hydrocarbons can easily be isolated by standard enrichment culture procedures. By varying parameters, such as temperature, pH, hydrocarbon concentration, and basal medium, a wide variety of different hydrocarbon-degrading and emulsifying bacteria can be obtained from aquatic or terrestrial environments [1, 2]. Determination, isolation and characterization of microorganisms which participate in the biodegradation of polycyclic aromatic hydrocarbons (PAHs) have great significance in the decontamination of the environment in shorter periods. Decontamination of PAHs, which cause environmental pollution and affect biological equilibrium dramatically, has also great significance for environmental and applied microbiology. In this study, the PAH degradation effects of some bacteria isolated from soil and seawater were investigated.

Material and Methods
The membrane filtration (Millipore) techniques were used to isolation of bacteria from sea water. M-Endo and m-FC were used for viable counts. Nutrient broth, Endo Agar, Bacillus Medium, Nutrient Agar were used for isolation of soil bacteria. Dubious colonies were identified using Nutrient Agar, SS Agar, Blood Agar, serologic and biochemical tests (SIM, API 20E) and identified strains were used for the degradation test. Minimum inhibitory concentration (MIC) values were obtained with a mineral salt medium. Identified strains [2, 3] were inoculated in to the medium which were supplemented with 1% crude oil and incubated on a laboratory shaker at 150 rpm and 25°C. Bacterial counts were carried out at 24 hour intervals and PAH degradation effects were observed by measuring the thickness of petroleum layers over one month [4].

Results and Discussion
The strains isolated from the soil within the Batman oil refinery and the Istanbul Strait and MIC values determined are summarized in Table 1.

Tab. 1. Isolated strains of the soil within Batman oil refinery and Istanbul Strait.

Samples	Isolates	MIC Values (%)
Soil within the oil refinery	*B. subtilis*	100
	P. aeruginosa	50
	E. coli	100
Istanbul Strait	*E. coli*	50
	V. fluvialis	100
	K. pneumoniae	50
	S. marcescens,	100

It was observed that *P. aeruginosa* and mixed cultures of all isolates from the soil within the Batman oil refinery efficiently use crude oil. Among the refinery isolates, *E. coli* caused an increase in the thickness of the petroleum layer and did not utilize the crude oil. *V. fluvialis, S. marcescens, K. pneumoniae* were determined to be the seawater isolates and were most effective in decreasing the surface area of the crude oil. These strains are stocked for further studies related to bioremediation.

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