

INVESTIGATING THE MUTAGENIC EFFECTS OF MEDITERRANEAN COASTS OF TURKEY

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Abstract

In the current study, mutagenicity experiments without metabolic activation using mutant TA98 strain of *Salmonella typhimurium* were performed on sediment samples of 8 stations chosen from Mediterranean Coastline of Turkey between September 2005 and October 2005. The study showed that sediment samples from selected stations were not mutagenic for the TA98 strain. The study is of importance in that it is the first one aiming at screening mutagenicity in the region.

Keywords : Pollution, Ecotoxicology, Sediments.

Introduction

Mediterranean Sea, of which coasts are shared by 21 countries, is regarded as an ecological inheritance for the world. According to the reports presented in the meetings held by United Nations Environmental Program (UNEP) and Mediterranean Action Plan (MAP), actions should be started immediately for Mediterranean Sea; because, it is bearing a load exceeding its capacity for a long time. Blue Plan Report in the context of MAP contains a scenario for situation of Mediterranean by 2005. Accordingly, riches of Mediterranean Sea will be run out if energy and water sources are not used well and terrestrial pollutants are continued to be discharged in Mediterranean Sea. Mediterranean Sea constitutes 0.7% of all sea water on the world and 7% of world population lives on the countries o its coasts. A total of 425 million people live in Mediterranean Region with 150 million of them living on its coastline. Mediterranean is most affected by load of tourism and marine transportation. Annually, about 200 million tourists come to Mediterranean coasts and population in the region doubles during tourism season. 30% of international marine traffic is performed on Mediterranean Sea with waters carried into Mediterranean Sea by ships alters the environmental balance in it. Solid wastes and waste waters must absolutely be prevented to be discharged into Mediterranean Sea. Annually, about 40 million ton of solid waste and 80% of waste waters as well as 150.000 ton of oil are being discharged into Mediterranean Sea. The nations should start actions on waste waters and solid wastes. Unfortunately, work on this issue is far from being satisfactory. "We determined that chemical wastes are being discharged from some regions into the sea", says Paul Mifsud, Coordinator of UNEP-MAP [1]. Detecting these chemicals with environmental effects is an important subject in terms of environmental and health science. This is, however, is a very difficult and practically impossible although not a truly impossible task because of complex molecular structure of organic chemicals in aquatic environments. Thus, short-term biological investigation methods make an accurate and practical tool in detecting toxic and/or mutagenic materials in the environmental samples [2]. Among them, *Salmonella typhimurium*/microsome assay (Ames test) is one of the most important tests [3]. Therefore, Ames's mutagenicity test was done with screening purposes in sediment samples from Fethiye, Antalya, Finike and Beymelek all located on coastal line of Mediterranean Sea.

Material and Methods

Sampling area

Sediment samples were taken from 8 stations September 2005-October 2005 in the context of study of project 104Y065 supported by TUBITAK

Sampling area :

- Stat.1 Fethiye Bay, 36°37'46" N - 29°06'32" E
- Stat.2 Fethiye Bay, 36°39'24" N - 29°04'44" E
- Stat.3 Fethiye Bay, 36°37'47" N - 29°04'39" E
- Stat.4 Beymelek Lagoon, 36°16'04" N- 30°02'57" E
- Stat.5 Finike Körfezi, 36°17'07" N- 30°10'02" E
- Stat.6 Finike Bay, 36°17'46"N- 30°09'18" E
- Stat.7 Antalya Bay 36°50'17" N- 30°36'31" E
- Stat.8 Antalya Bay 36°49'53" N- 30°37'08" E

Van-Veen grab sampler was used in obtaining sediment samples. Samples taken from surface layer (sampling an area of 0.1 m⁻²) with metal spatula were stored under cold-chain and then dried in the incubator at 60°C.

Extracting the samples: Sediment samples from Mediterranean sea were crash to powder and sifted in the laboratory and then placed in portions of 1 gram into sterile teflon tubes and mixed with hexane/chloroform/acetone (1:1:1 v:v:v) using a vortex mixer [4]. Subsequently, the samples were centrifuged for 10 minutes at +4°C at 5600 g in Sigma K3 cooled centrifuge and supernatants were taken into sterile tubes. Organic solvent of

sediment samples was evaporated after this procedure had been repeated for 3 times and it was dissolved by adding 1 ml of Dimethylsulfoxide (DMSO). When testing for mutagenicity without metabolic activation, 100 µl and 200 µl of organic extract was mixed with 100 µl of an overnight culture of bacteria and 2 µl of melted agar containing 5mM histidine and biotin. The molten top agar was then poured onto a minimal glucose agar base plate and incubated at 37°C for 2 days. Mitomycin-C (0.5 µg/plate) were used as positive controls. Each dilution of extract and controls were assayed in triplicate. Following incubation, the number of revertant colonies was counted (His⁻ revertants)[3]. *Salmonella* mutagenicity tests were performed using the standard plate incorporation method with the TA98 strains of *Salmonella typhimurium*, [3].

Results and Discussion

No mutagenic results were obtained with TA98 strain of *S.typhimurium* in the current study using experiments with Ames test on sediment samples from 8 stations on Mediterranean coast (figure 1). However, results that will be obtained using TA 100 strain of *S.typhimurium* will be compared those of sediment extracts from 8 stations. In conclusion, it is pleasant that mutagenicity was not found in sediment samples from selected locations although pollution of Mediterranean by chemical wastes and tourism has been reported by UNEP and MAP.

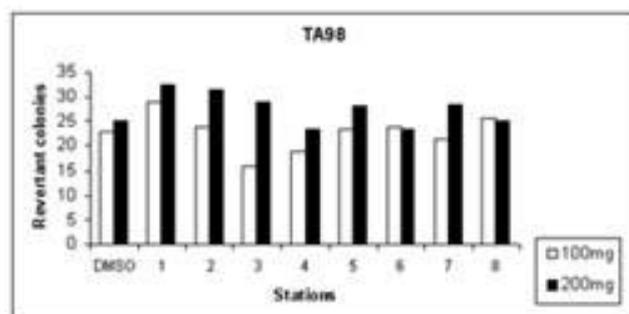


Fig. 1. Mutagenicity analysis of sediment samples with *S. typhimurium* TA98

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