

PH-13

Selection and characterization of indigenous hydrocarbon-degrading bacteria from tourist ports in the Mediterranean Sea Basin

Enrica Bullita¹, Claudio Ruggeri¹, Simona Sergi¹, Laura Serreli¹, Giovannimatteo Erby², Alessio Nieddu², Alessandra Carucci², Elena Tamburini^{1,*}

¹ University of Cagliari - Department of Biomedical Sciences

² University of Cagliari - Department of Civil-Environmental Engineering and Architecture

Pollution by petroleum hydrocarbons is one of the major environmental problems in ports and it is mainly associated with ship/boat traffic and related facilities. Ports are not closed systems and their pollution may impact adjacent coastal areas. Hydrocarbon degraders and particularly the obligate hydrocarbonoclastic bacteria carry out a fundamental and global activity in biological removal of hydrocarbons in marine habitats.

This study was carried out within MAPMED, a multidisciplinary project aimed to improve the environmental sustainability of tourist ports in the Mediterranean Sea with regard to monitoring and reduction of hydrocarbon pollution.

Three tourist ports were selected as case study sites: Cagliari (Italy), El Kantaoui (Tunisia), and Heraklion (Greece). The degradation potential of the autochthonous bacterial communities was evaluated enumerating heterotrophs and hydrocarbon degraders by MPN in the surface seawater. Heterotrophs were significantly more abundant in seawater from Cagliari port as compared to El Kantaoui and Heraklion ports. On the contrary, higher viable titles of diesel- and phenanthrene-degraders were found in seawater from El Kantaoui port compared to the other two areas. Hydrocarbon-degrading bacteria were isolated and characterized regarding their phylogenetic position and catabolic abilities. The hydrocarbon degradation activities were evaluated by GC-MS in aerobic batch reactors on diesel as carbon source. The majority of degraders from Cagliari were assigned to *Pseudomonas* whereas strains from El Kantaoui and Heraklion were assigned to *Alcanivorax* and *Marinobacter*.

The selection of the most appropriate methodologies for the eco-efficient remediation of petroleum-hydrocarbon contamination of selected sites is currently in progress.

<http://dx.doi.org/10.1016/j.nbt.2014.05.1952>

PH-14

Characterization of sulphate reducing bacteria communities in sediments from tourist ports in the Mediterranean Sea Basin

Claudio Ruggeri^{1,*}, Paolo La Colla², Enrica Bullita², Simona Sergi², Francesco Vitali³, Giorgio Mastromei³, Elena Tamburini²

¹ University of Cagliari

² University of Cagliari - Department of Biomedical Sciences

³ University of Florence - Department of Biology

Ports receive pollution from land, ships and port facilities. Furthermore, tourist ports are subject to seasonal anthropogenic impacts. Hydrocarbon contamination associated with port activities poses major concerns for human health and coastal ecosystems.

This study was carried out within MAPMED, a multidisciplinary project aimed to improve the environmental sustainability of tourist ports in the Mediterranean Sea with regard to monitoring and reduction of hydrocarbon pollution.

Three tourist ports were selected as case study sites: Cagliari (Italy), El Kantaoui (Tunisia), and Heraklion (Greece). In each port, sampling stations were located in different sectors according to their different uses. Three sampling campaigns were carried out in winter, spring at the beginning of tourist season and late summer at the end of tourist season. Samples of surface and anoxic sediments were collected at different stations.

The *dsrAB* gene was chosen as genetic marker to specifically characterise sulphate reducing bacteria (SRB). It codes for the dissimilatory sulphite reductase catalysing the last step in the sulphate reduction pathway. Hydrocarbon degradation under sulphate-reducing conditions is an important process in marine sediments in anoxic environments. T-RFLP analysis of *dsrAB* gene was employed to elucidate the community structure of SRB. This work provides a spatial comparison of SRB at two scales, different port sectors within each port area and different port areas across the Mediterranean Sea, as well as a temporal comparison among different seasons.

The selection of the most appropriate methodologies for the eco-efficient remediation of petroleum-hydrocarbon contamination of selected sites is currently in progress.

<http://dx.doi.org/10.1016/j.nbt.2014.05.1953>