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**Isolation, identification and metabolic characterization of hydrocarbonoclastic bacteria from a polluted harbour in Sicily (Italy)**

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**Abstract**

The petrochemical site of Priolo-Augusta-Melilli (Sicily, Italy), is a Site of National Interest (SIN) due to high levels of environmental contamination of the coastline and a specific "national program of environmental remediation and restoration" was developed in order to allow remediation and restoration of contaminated sites.

In order to identify the key hydrocarbon degraders and explore the natural bioremediation potential of the contaminated area, a total of six sediment and sea water cores were collected inside the Priolo Harbour (SR, Italy). After biological (bacterial counts, PCR-DGGE) and chemical-physical characterization (quali-, quantitative measures of hydrocarbons and heavy metals) samples were used, separately, to set enrichment cultures on mineral broth containing different mixtures of linear (C<sub>16</sub>, C<sub>18</sub>, C<sub>20</sub>) and aromatic (phenatrene, pyrene, biphenyl and dibenzothiophene) hydrocarbons and Crude Oil (Arabian Ligth Crude Oil). A total of 159 isolates (82 from seawater and 77 from sediments) were obtained. The sequencing of 16S rDNA showed that most of the isolates belong to the well known HC degraders genera *Alcanivorax* (44 %), *Marinobacter* (17%) and *Thalassospira* (9%) and also to rare specialised HC degraders such as *Oleibacter*.

Data obtained from assays of biodegradation on a range of HC revealed that some of the most interesting bacteria present a very high potential of application in bioremediation practices; furthermore these data give a deeper understanding of the biochemical causes of metabolic specialization and could serve as a foundation for the field of synthetic ecology, where the objective would be to rationally engineer the assembly of a microbial community to perform a desired biotransformation.