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Programme and abstracts

| B22 | **Potential use of plant growth-promoting Bacilli as bioremediation in soils contaminated by copper and nickel.** |
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Due to natural and anthropogenic processes, heavy metal contamination of soil represents a considerable risk for humans and the biosphere, negatively affecting ecosystem health. Traditional contaminated soil remediation technologies are complex processes that reduce soil fertility and are ineffective in treating low-concentration, large-scale heavy metal contamination. As a result, an environmentally friendly and safe strategy to ensure agricultural productivity is required. Among alternative approaches, Plant Growth-Promoting Bacteria (PGPB) are receiving increased interest. PGPB enhance plant growth, as well as protect plants from several biotic and abiotic stresses through a variety of mechanisms. Moreover, these beneficial bacteria create symbiotic relationships with plants and can alleviate the toxicity of heavy metals through metal biosorption, bioaccumulation, redox reaction, mobilization, precipitation, and transformation. In this study, we tested two different consortia of Bacilli PGPB to alleviate copper and nickel contamination in wheat plants. Both consortia can tolerate up to 1000ppm of $CuSO_45H_2O$ and $NiCl_26H_2O$, and the ICP-MS analysis demonstrated the ability of the PGPB to reduce the concentration of metals in media. When inoculated in metal-contaminated soil, both consortia significantly improved the survival of wheat plants', increasing the root and shoot growth and total fresh weight. The consortia were also able to inhibit the growth of wheat plants pathogenic fungi in the presence of heavy metals. One of the two consortia resulted most performed, and they could be proposed as bioinoculant for the metal bioremediation process and as an alternative to chemical pesticides and fertilizers.

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| B23 | **A bacterial consortium for treatment of Fat, Oil, and Grease (FOGs) in wastewater treatment plants** |
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Fats, oils and greases (FOG), CER 190809, in wastewater create problems including the production of foul odours, the blockage of sewer lines and interference with the proper operation of sewage treatment works. Removal of FOG is thus critically important to ensure that wastewater is disposed of efficiently and economically. In this study, 232 bacterial strains were isolated and screened for the ability to degrade lipids from a specialized treatment plant, where a enhanced FOG degradation activity had been detected. Enrichment cultures on oily substrates, followed by isolation on selective media for lipase producing bacteria, and enzymatic methods were used to screen lipolytic microorganisms. In a second step, the lipolytic bacteria were analyzed using a colorimetric assay to detect the transesterification activity of para-nitrophenyl-palmitate. Four best performing lipid-degrading bacteria were identified by 16SrDNA sequencing, and investigated for application in treatment of lipids-contaminated wastewater, in Sequencing Batch Reactor (SBR) pilot plant. The FOG biodegradation efficiency was evaluated after 10 days using the gravimetric method for quantitative determination of total oily substances. The bacterial strains were Gram negative affiliated to *Serratia*, *Aeromonas*, *Pedobacter* genera. The Bacterial consortium was

able to degrade 76% of FOG in 10 days treatment. The strains are be of great interest at industrial scale to increase the removal of FOG in wastewater treatment plants, and directly in the waste storage tanks at catering establishments, to reduce the polluting load before transfer to the disposal plan. The process of bioaugmentation using the FOG degrading consortium was recently patented (n°812021000056699).

## B24 Isolation and characterization of novel hydrocarbon-oxidizing bacterial strains for the environmental remediation

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Nowadays, industrialization and urbanization have determined an increase of the demand for petroleum hydrocarbons and, accordingly, of the risk for air, soil and water pollution, because of oil extraction and fuel transport accidents. Therefore, due to the increasing number of hydrocarbon-contaminated sites, it has become essential and a priority to restore these areas through biological remediation technologies. The main purpose of this research was to isolate and characterize novel hydrocarbonoclastic bacterial strains, potentially capable of producing biosurfactants and employable in bioremediation. Accordingly, water and surface sediments were collected from two sampling sites in the municipality of Tramutola (Southern Italy), which are naturally hydrocarbon-contaminated environments.

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Through a combining of molecular and culture-dependent approaches, different bacterial strains were isolated by enrichment cycles in Bushnell-Haas (BH) mineral medium supplemented with diesel fuel as the sole carbon source and characterized from a morphological, genetic (through 16S rRNA-encoding gene sequencing), and metabolic point of view. In addition, they were tested for biosurfactant production through the analysis of emulsifying capacity and emulsion index.

The results obtained from these assays showed that these strains were able to produce emulsions with diesel fuel with high stability over time. These preliminary results pave the way for further investigations aimed at defining in more depth the degradation capacity of the isolated bacteria, and/or of microbial consortia, for the remediation of hydrocarbon-contaminated sites and their ability to produce molecules with a promoter effect for the removal of petroleum hydrocarbons.

## B25 The bacterial communities colonizing five urban caves in Rome, Italy

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Urban cavities are man-made cavities located in metropolitan areas. While natural caves are well-studied model ecosystems characterized by darkness, physical insulation, and dependence on internal microbial biomass production for energy supply, little is known about the urban cave ecosystems and the microbial communities thriving in these environments. We investigated the bacterial community structure in groundwater, sediment, and biofilm samples from five tuff caves in the metropolitan city of Rome (Italy) underground, all originating from pyroclastic deposits. The physicochemical analysis of the water and sediment showed oligotrophic conditions and