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P-130 - ENRICHMENT OF BACTERIAL STRAINS FOR THE BIODEGRADATION OF ENDOCRINE DISRUPTING COMPOUNDS FROM SEDIMENTS OF THE PEARL RIVER DELTA (PRD)

Irina S. Moreira[2]; Alexandre Lebel[1]; David Gonçalves[1]; Paula M. L. Castro[2]

1 - Institute of Science and Environment, University of Saint Joseph, Macau SAR, China; 2 - Universidade Católica Portuguesa, CBQF - Centro de Biotecnologia e Química Fina – Laboratório Associado, Escola Superior de Biotecnologia, Rua Arquiteto Lobão Vital 172, 4200-374 Porto, Portugal

Background

Endocrine disrupting chemicals (EDCs) are those which alter the homeostasis, reproduction, development and/or behaviour of organisms. Negative effects have been reported on aquatic species, wildlife, and humans due to exposure to very low (ng L−1) concentrations [1]. A large number of chemicals have been identified as EDCs. Wastewater treatment plants are not able to completly remove these chemicals, contributing to the contamination of receiving water bodies. The situation of The Pearl River Delta (PRD) is of particular concern due to the high industrialization and dense urbanization [2,3].

Method

Selective enrichments with bisphenol A (BPA), bisphenol S (BPS), 17β-estradiol (E2) and 17α-ethynilestradiol (EE2) were established with activated sludge collected from an aeration tank of a sewage treatment plant located in Coloane (Macao) and sediment samples from the discharge point of the same station. Bacterial strains were isolated from successful degrading consortia by plating on Nutrient Agar and identified by 16S rRNA sequencing. Degradation of the compounds by the isolates was tested first on minimal agar plates and then in liquid media, with EDCs as sole carbon source.

Results & Conclusions

After two months, the enriched consortia were able to completely degrade 10 mg L-1 of BPA in three days, while BPS was not degraded. For the hormones, degradation of E2 varied between 20 and 100%; degradation of EE2 varied between 36 and 77%, in 15 days. A total of 28 strains were isolated from the degrading consortia. The maximum extent of degradation obtained for the isolates was 67% for EE2 and 100% for E2, supplied at 4.5 mg L-1, and 23% for BPA and 34% for BPS, supplied at 9.5 mg L-1, during 28 days. The isolated strains represent valuable candidates for in situ bioremediation of contaminated environments. Promising results were obtained for strain identified as Castellaniella sp. ED55, able to degrade the four compounds at different extents. Further studies are ongoing to deepen the knowledge about the mechanisms of degradation by that strain, including genome sequencing and transcriptomic experiments.

References & Acknowledgments

[1] doi:10.1021/es0201348.
[2] doi:10.1007/s11356-016-7377-7.
[3] doi:10.1016/j.ecoenv.2015.09.029.

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