

Master Research Project

Exploring new microorganisms for bioremediation of wastes containing pharmaceutical compounds

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Duration: 1 year

Host laboratory/Institution: Laboratory of Bacterial Energy Metabolism/ ITQB.UNL, Oeiras

Abstract:

The detection of pharmaceutical products (PhP) in the environment has become a worldwide issue. Their accumulation and persistence in the environment raises serious concerns since they can produce harmful effects on human and animal health and on the ecosystem. Therefore it is essential to develop innovative and cost-effective approaches to remove these pollutants from water and wastewaters. Biodegradation processes using anaerobic microorganisms are a potential alternative for PhP removal. For the development of an efficient bioprocess it is crucial to identify high PhP-resistant microorganisms with the ability to degrade them. To date, the knowledge of anaerobic PhP-degrading microorganism is quite scarce. Thus, the present proposal intends to enrich anaerobic bacteria from environmental samples and investigate their ability to degrade pharmaceutical products in three different electron acceptor conditions, nitrate-reducing, sulfate-reducing, and methanogenic conditions. The presence and relative abundance of specific microbial groups will be determined by fluorescence in situ hybridisation (FISH). Furthermore, a molecular characterization of the most promising bacterial consortia will be performed by sequencing of their 16S rRNA gene.

This Master project involves a multidisciplinary approach to explore the potential of anaerobic bacterial for bioremediation of PhP-containing wastewaters. It will involve microbiology and molecular biology methodologies, namely bacterial enrichment from environmental samples, DNA extraction and amplification and phylogenetic characterization. In addition, several analytical methods, such as spectrophotometry and HPLC will be used to determinate the PhP biodegradation.

This work will contribute to understand the anaerobic biodegradation of pharmaceutical products and will improve the knowledge about the bioremediation of environments contaminated with pharmaceutical products.