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ENRICHMENT AND ISOLATION OF A BACTERIAL STRAIN ABLE TO DEGRADE SULFAMETHOXAZOLE

Patrícia J. M. Reis[1]; Ana C. Reis[1]; Célia M. Manaia[2]; Philippe F.X. Corvini[3]; Olga C. Nunes[1]

[1]*LEPAE – Departamento de Engenharia Química, Faculdade de Engenharia, Universidade do Porto*
[2]*CBQF – Escola Superior de Biotecnologia, Universidade Católica Portuguesa*
[3]*Institute for Ecopreneurship, School of Life Sciences, University of Applied Sciences and Arts Northwestern Switzerland*

Sulfonamides are a large family of synthetic compounds, which include antimicrobials, antidiabetics, diuretics, and pesticides. Hence, environmental contamination with these active ingredients is inevitable. Besides the toxic effects, some of these micropollutants may contribute to the acquisition and spread of antibiotic resistance.

The major aim of this study was the isolation of a microbial culture, with potential to be used in the treatment of sulfonamides-polluted waters.

A mixed culture able to mineralize sulfamethoxazole (SMX) under aerobic conditions was isolated from an enrichment culture of activated sludge and treated domestic wastewater. The mixed culture, comprising four different bacteria, could degrade SMX with the simultaneous stoichiometric accumulation of 3-amino-5-methylisoxazole (3A5MI), indicating that only the aniline moiety of SMX was transformed. The aniline moiety of SMX was observed to support bacterial growth, although with low biomass yields (0.100 ± 0.023 g SMX g cell dry wt $^{-1}$ at), when used as single source of carbon and energy (10 mM SMX) in mineral medium. In addition, it was evidenced that the aniline moiety of SMX was majorly transformed into CO_2. The accumulation of 3A5MI at concentrations up to 20 mM did not inhibit SMX degradation.

Among the four members of the mixed culture, only *Achromobacter denitrificans* strain PR1 showed ability to degrade SMX in pure culture. However, in opposition to the mixed culture, strain PR1 could not degrade SMX in mineral medium and required an additional source of carbon and energy, such as succinate, or amino acids and/or vitamins and nitrogen bases to growth and remove the antibiotic. These observations suggest that strains PR2, PR3 and PR4, contribute for the activity of the mixed culture by providing strain PR1 with growth factors. Strain PR1, due to its ability to degrade SMX, may be an interesting tool to be used in wastewater treatment processes, since 3A5MI is inactive as antimicrobial agent.

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