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Development of treatment methods for the degradation of antimicrobial compounds present in wastewaters

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The intensive use of antibiotics and disinfectants has been leading to the environmental contamination with these micropollutants or with their toxic degradation products. The widespread distribution of these contaminants may have harmful effects, such as the reduction of microbial diversity and the spreading of antimicrobial resistance (AR). The increase of AR leads to a generalized claim that micropollutants with antimicrobial activity must be removed from industrial, hospital and domestic wastewaters. Among the different mechanisms that bacteria can use to resist the antibiotic action, degradation is one of the most often used to tolerate beta-lactams. The diversification of beta-lactamases in the environment has been observed over the last years and, curiously, such a property can also be of interest to attenuate antibiotics contamination. Indeed, the implementation of degradation methods is urgently needed.

The present study aims at developing low cost efficient treatment systems to remove beta-lactams from wastewaters, by using microorganisms able to degrade these antibiotics..Biodegraders thriving in wastewater treatment plants have been enriched usingin amoxicillin supplemented culture media. Mixed cultures able to transform approximately 100 % of 30 mg L^{-1} amoxicillin to non-active degradation products were obtained. The members of these cultures were identified and their antibiotic resistance phenotype was determined. The genetic determinants responsible for their degrading activity were also characterized. The diversity of bacteria and of genes involved in these processes will be also discussed.