

Isolation and characterization of emerging pollutant-degrading microbial consortia from WWTPs



Juárez Mugarza, Maitane, Canosa Pérez-Fragero, Inés & Flores Díaz, Amando



Department of Molecular Biology and Biochemical Engineering. Andalusian Center for Developmental Biology. Pablo de Olavide University, Ctra. Utrera, km 1, 41013 Seville, Spain

Background

The increase of emerging pollutants, and the environmental and health hazard they pose, has created the need to research possible degradation mechanisms for them. One method is the use of bacteria able to biodegrade such compounds. Wastewater Treatment Plants (WWTPs) are a great biomass source, as most of those pollutants can be found there. Therefore, it is imperative to identify, isolate and characterize emerging pollutant-degrading consortia found in WWTPs.

Methods

Enriched cultures containing either naproxen-degrading or ibuprofen-degrading consortia were used, in order to determinate their growth rates and ability to degrade the contaminants. For that, consortia were grown on flasks, with the chosen compound (naproxen or ibuprofen) as the sole carbon source. Their growth was monitored by measuring absorbance at 600nm, and the chosen carbon source degradation was followed by HPLC. In addition, further isolation of the consortia was attempted in petri plates, and the 16S rRNA regions were amplified and sequenced.

Results

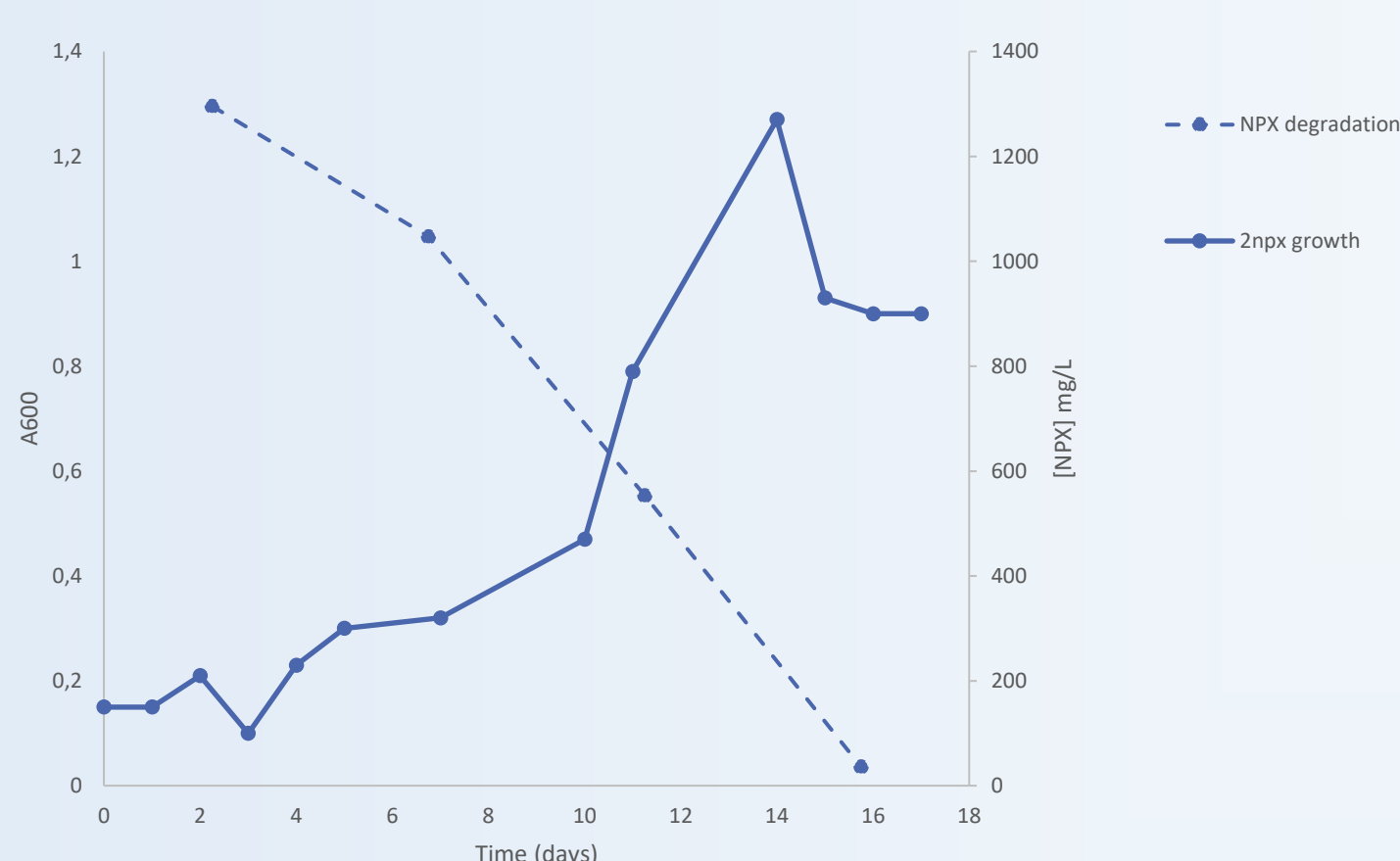


Figure 1. 2npx consortia growth in 10 mL volumen flask, with a starting naproxen (NPX) concentration of 1 g/L, and measurement of NPX degradation alongside mentioned growth, in mg/L. The experiment lasted 17 days and growth was measured by absorbance, at 600nm.

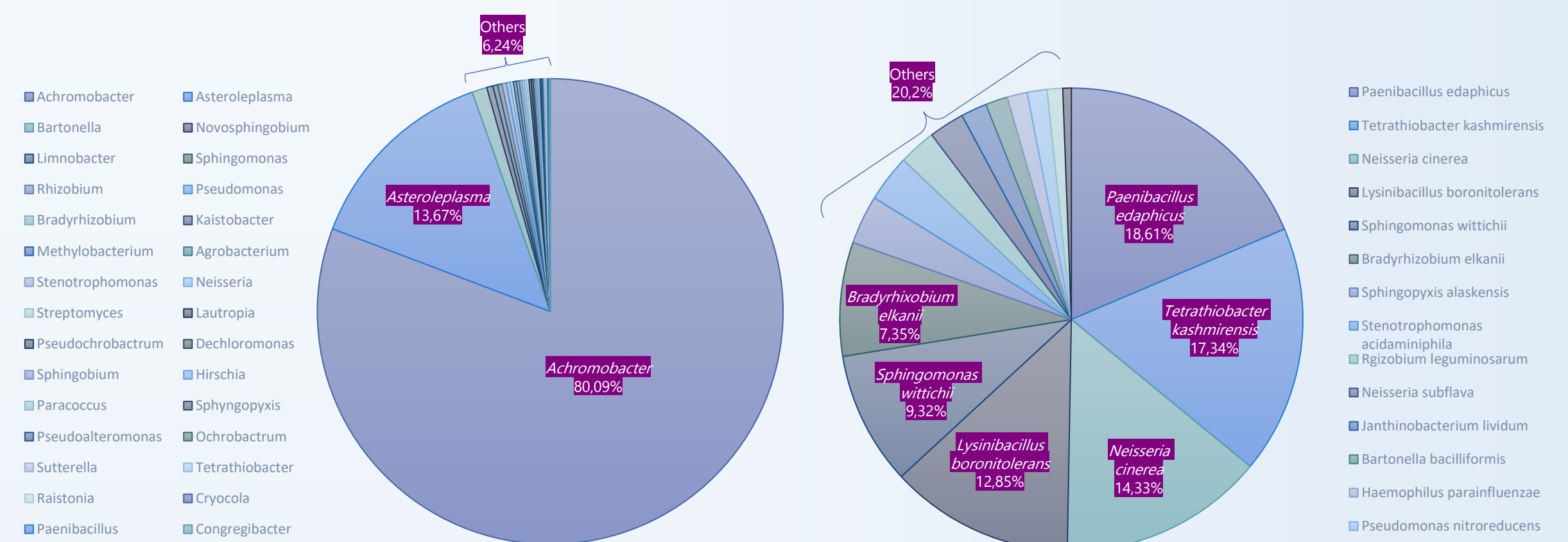


Figure 2. 2npx consortia genus abundance estimation (left) and species abundance estimation (right). DNA extraction and 16S rRNA sequencing allowed the construction of meta-gen libraries. Data was treated with Kraken2 and compared with RDP and Greengenes sequence databases

Conclusions & Future approach

- ❖ WWTP isolated bacteria are able to form emerging-contaminant biodegrading consortia.
- ❖ Their growth and degradation-rate conditions are yet to be optimized.
- ❖ Further study is needed to define possible emerging pollutant-degrading pathways.

References

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