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"Myco-fluidics" for soil remediation: Developing a microfluidic tool to monitor the solubilization and uptake of a persistant soil pollutant in filamentous fungi

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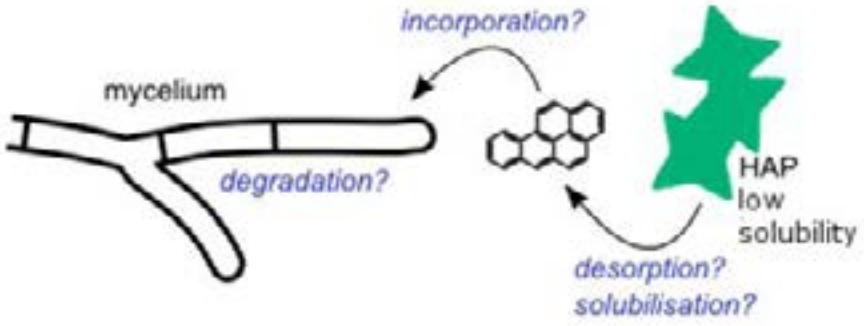
Bioremediation appears as a relatively low-cost solution for the restoration of soils contaminated with persistent organic pollutants. Among these pollutants, high molecular weight polycyclic aromatic hydrocarbons (PAHs) display a high resistance to degradation and low bioavailability.

Filamentous fungi are known for their ability to degrade complex substrates, and some soil fungi, such as *Talaromyces helicus*, showed promising results regarding the biodegradation of PAHs. However, the mechanisms involved in the incorporation and biodisponibility modifications of these pollutants remain poorly understood.

In this context, the Myco-fluidics project aims at using microfluidics to mimic the soil microenvironment and monitor the solubilization and uptake of pollutants in filamentous fungi in vivo. This approach allows direct microscopic observations at a cellular scale, in complement with a characterization of the degradation in macroscopic cultures.

Preliminary results show the intracellular storage of benzo[a]pyrene in *T. helicus* hyphae, and suggest the release of tensio-active compounds likely to promote the desorption and stabilization of HAPs in the aqueous phase.

In a broader perspective, this soil-on-a-chip model could be used as a new tool to investigate parameters affecting the biodegradation of pollutants, in order to develop more efficient fungus-mediated soil cleanup strategies.



Biography

Claire Baranger graduated from the Ecole Supérieure de Biotechnologie de Strasbourg, France, in 2015. She is a trained biotechnologist with experience in microbiology and enzymology, and has a specific interest in mycology and environmental biotechnologies. She is currently pursuing a PhD at the Université de Technologie de Compiègne in France.

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