

## Master thesis topic

for students with a background in biological/environmental sciences or suitable related disciplines:

### **Potential of fungi from urban habitats to metabolise synthetic polymer-borne environmental contaminants**

Environmental pollution with synthetic polymers poses a global threat to ecosystems and human health. Beyond the polymers themselves, environmental and human health risks are also related to the release of various additives incorporated to improve certain properties of plastics/polymers. Phthalate esters (PEs, phthalates) belong to such compounds, with endocrine-disrupting bis(2-ethylhexyl) phthalate (DEHP) and dibutyl phthalate (DBP) representing important examples. Careless disposal of plastics coupled with atmospheric deposition and rainfall transfer has led to widespread environmental PE contamination. Typically, PE levels are very high in urbanized areas. Due to intense urban traffic, tire wear particles stemming from abrasion of vehicle tires are another important source of urban pollution. These synthetic rubber-based particles release numerous compounds of environmental concern, which e.g. are related to manufacturing of rubber or were included to improve its properties. Prominent examples for such contaminants are the antioxidant N-(1,3-dimethylbutyl)-N'-phenyl-pphenylenediamine (6-PPD) and the vulcanization accelerator 2-mercaptobenzothiazole (2-MBT).

In this context, the offered MSc topic aims to assess the fungal potential for the breakdown of selected representatives of the aforementioned groups of synthetic polymer-derived environmental pollutants. To this end, fungi that previously have been isolated from the UFZ Research Green Roof facility (<https://www.ufz.de/index.php?en=44676>) will be employed together with further fungal strains available from the strain collection of UFZ's Department of Environmental Microbiology. In addition, further fungal strains are intended to be newly isolated from the UFZ Research Green Roof and/or from accessible landfills with known deposition of plastic waste. The MSc project will strive to characterize contaminant biotransformation processes kinetically, to shed light on potentially involved biochemical reactions and enzymes, and to investigate the influence of accompanying factors (e.g. potential C and N sources or enzyme inducers) on urban contaminant metabolism. Parent contaminants and potential biotransformation metabolites will be analysed by Ultra Performance Liquid Chromatography (UPLC), and activities of potentially involved enzymes will be followed using a microplate reader.

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