Plastic pollution, a global challenge: How do we find the best-plastic eating bacteria in nature?

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Petroleum-based plastics are durable and accumulate in all ecological niches. Knowledge on enzymatic degradation is still very limited. Today, less than 200 verified plastics-active enzymes are known. During my presentation I will give an overview on the current status and potential of plastic active enzymes for plastic recycling and remediation. The best studied enzymes are those acting on the polymers polyethylene terephthalate (PET) and polyurethane (PUR, ester-based). Furthermore, very few polyamide (PA) oligomer active enzymes are known. To advance this field we have developed and applied a highly efficient Hidden-Markov-Model based search pipeline for the identification of novel hydrolases acting on ester-based polymers. Using this pipeline in combination with *in vitro* transcription and translation approaches, we were able to enrich the known biodiversity of PETases and PURases significantly and by mining in global and local metagenomes. Within my presentation I will highlight advances in metagenome screening technologies for plastic-active enzymes using fluorescent and non-fluorescent reporter systems. Furthermore, I will report on our efforts to obtain polyamidases using smart enrichment and cultivation approaches.