Marine plastic biodegradation: what is *Alcanivorax*'s role?

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The ocean plastic pollution is a worldwide detrimental problem, affecting organisms living in the marine environment, as well as (indirectly) terrestrial life. Plastics are generally build with polymers derived from crude oil, which is the sole carbon source of hydrocarbonoclastic bacteria such as the *Alcanivorax* genus. This genus occurs in very small numbers in clean natural seawater and becomes dominant in seawater polluted with aliphatic hydrocarbons. When investigating the plastisphere of different types of plastics in the marine environment, *Alcanivorax* are often identified. Despite their presence, the exact role of the *Alcanivorax* genus in marine plastic degradation is not well understood. It is not completely clear whether *Alcanivorax* are degrading the plastic material itself, or just growing on breakdown products of the plastic released by other microorganisms within the plastisphere.

To identify the role of *Alcanivorax*, we first needed to confirm their presence in the plastisphere. Therefore, we isolated oil degraders from plastic degrading seawater enrichments using the dilution to extinction technique. After 16S rRNA sanger sequencing, we identified two *Alcanivorax* isolates, most probably *Alcanivorax* DG881 and *Alcanivorax borkumensis*. This outcome was confirmed by mapping back the 16S rRNA gene sequence of the isolates to 16S rRNA gene sequencing data of the original enrichments; the *Alcanivorax* isolates were already present in the initial enrichments. Subsequently, we tested the activity of the isolated *Alcanivorax borkumensis* strain on nylon compared to a mixture of cyclododecane and dodecane. Growth was followed through time on the different carbon sources with flow cytometry. The degradation rate of both carbon sources was measured, using total organic carbon (TOC) analysis and gas chromatography equipped with a flame ionisation detector (GC-FID), for the fractions of nylon and the mix of cyclododecane and dodecane respectively. Moreover, the activity of the isolated *Alcanivorax borkumensis* strain was investigated with bioorthogonal non-canonical amino acid tagging (BONCAT) followed by fluorescence *in situ* hybridization (FISH).

To identify the importance of the *Alcanivorax* genus during plastic degradation further, additional experiments will be performed. The metabolic activity after exposure to fresh polymers of communities with *Alcanivorax* will be determined, after which the active fraction will be sorted and identified.

Keywords: Plastic pollution; Alcanivorax; Biodegradation; Isolation; Bacterial activity