

# Physical and chemical effects of microplastics on the marine polychaete *Capitella* spp.

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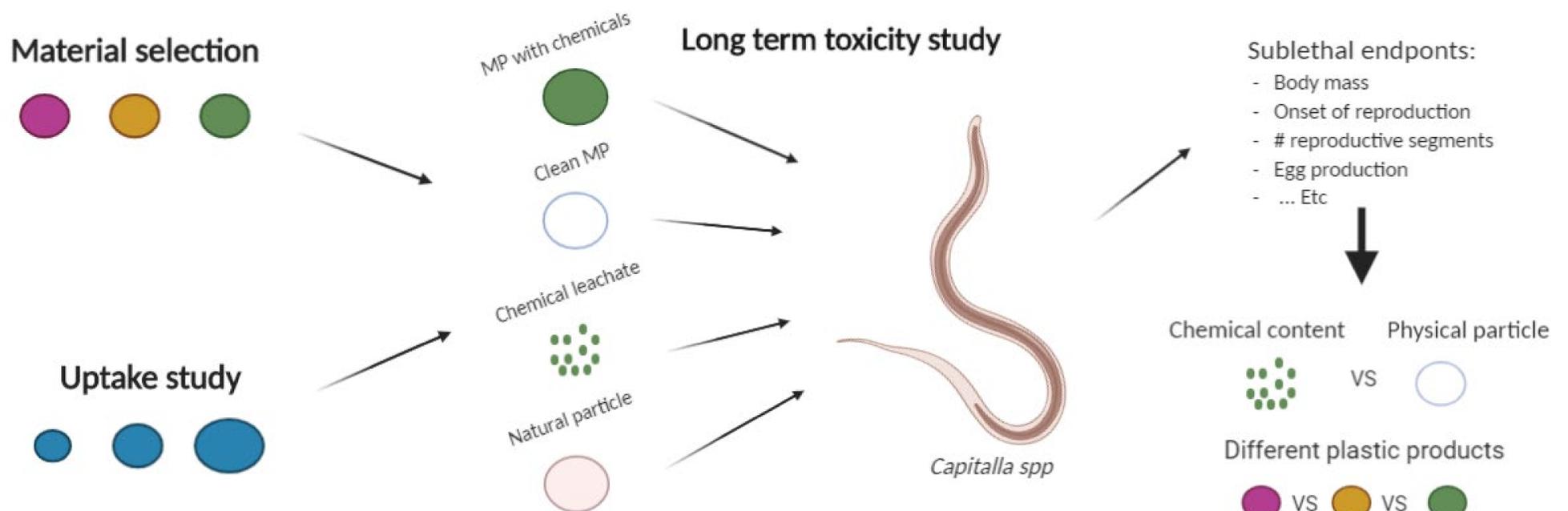
## Introduction

- Plastic additives and non-intentionally added substances may alter microplastic (MP) toxicity
- The number of chemical features varies greatly in different plastic materials
- Combining chemical analysis and baseline toxicity screening can help predict which plastic materials will have a higher toxic effect on higher organisms
- As MPs accumulate in sediments, benthic deposit feeders might be of high risk to MP and plastic additive exposure

## Goals

- Determine sublethal endpoints of long-term MP and leachate exposure in the marine polychaete *Capitella* spp.
- Identify the respective contribution of physical particle and chemical content on observed toxicity
- Elucidate the difference in toxicity from “highly toxic” and “less toxic” plastic products

## Approach

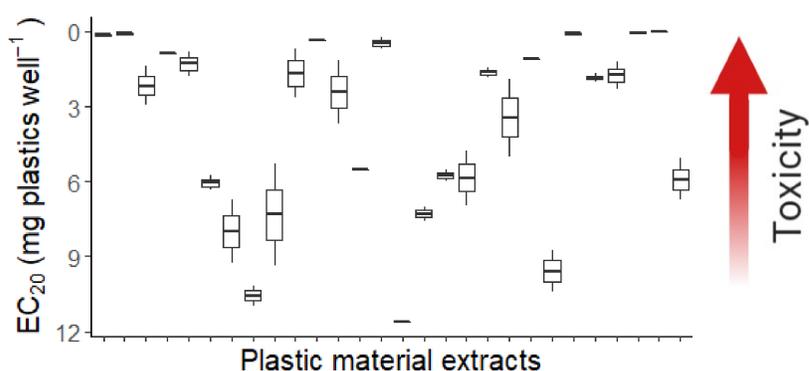


## Material selection

### A Chemical characterization

- Non-target chemical analysis of 50 plastic products using GC-MS
- Found **>3000 chemical features**, ranging between **2 - 129 features per product**.
- Highest and lowest content considered for testing in *Capitella* spp. studies

### B Baseline toxicity

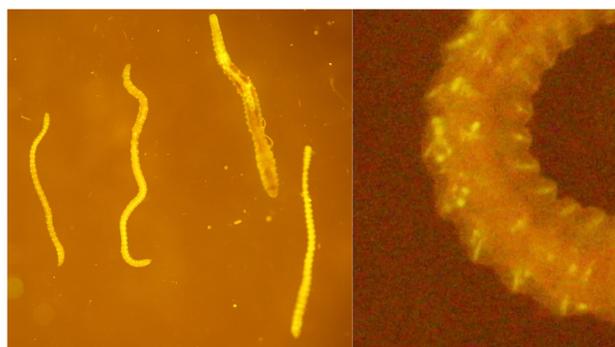


- Results of the screening of plastic extracts in the Bacterial Luminescence Toxicity screen.
- The concentration inducing 20% luminescence inhibition (EC<sub>20</sub>, mean of 2-3 experiments) is shown.

## Uptake study

### Goal: Identify the size range of particles that *Capitella* ingests

- Using a tiny and autofluorescent species provides challenges with quantification of uptake



Method optimization has included:

- Different methods of digestion and staining of plastic
- Preliminary exposures with fluorescent MP-beads
- Visualization of fluorescent beads in *Capitella* spp. and fecal pellets

## Outlook

- Continued optimization and final uptake study of MP in *Capitella* spp.
- Selection of 2-3 materials for the long-term toxicity study based on chemical characterization and baseline toxicity data (high and low)
- Cryomilling of selected materials and leachate production
- Long term exposure (3-4 weeks)
- Analysis of sublethal endpoints