Effects of different microplastic polymers on the terrestrial woodlouse *Porcellio scaber* and the associated gut microbiome

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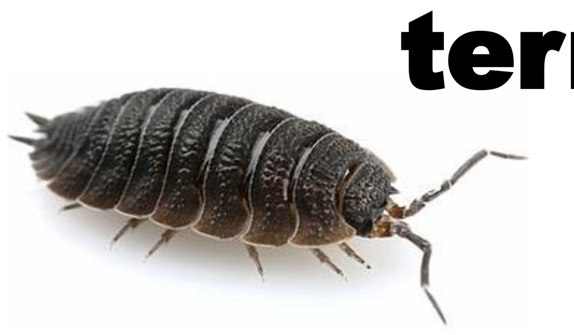

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Introduction

- *P. scaber* is a widespread, important decomposer associated with nutrient cycling in soil
- Microplastic (MP) is an ubiquitous pollutant in terrestrial and many other ecosystems
- MP might enter food webs via unintentional ingestion and affects gut microbiomes (important for digestion)

➔ Assessment of MP effects on *P. scaber* warranted

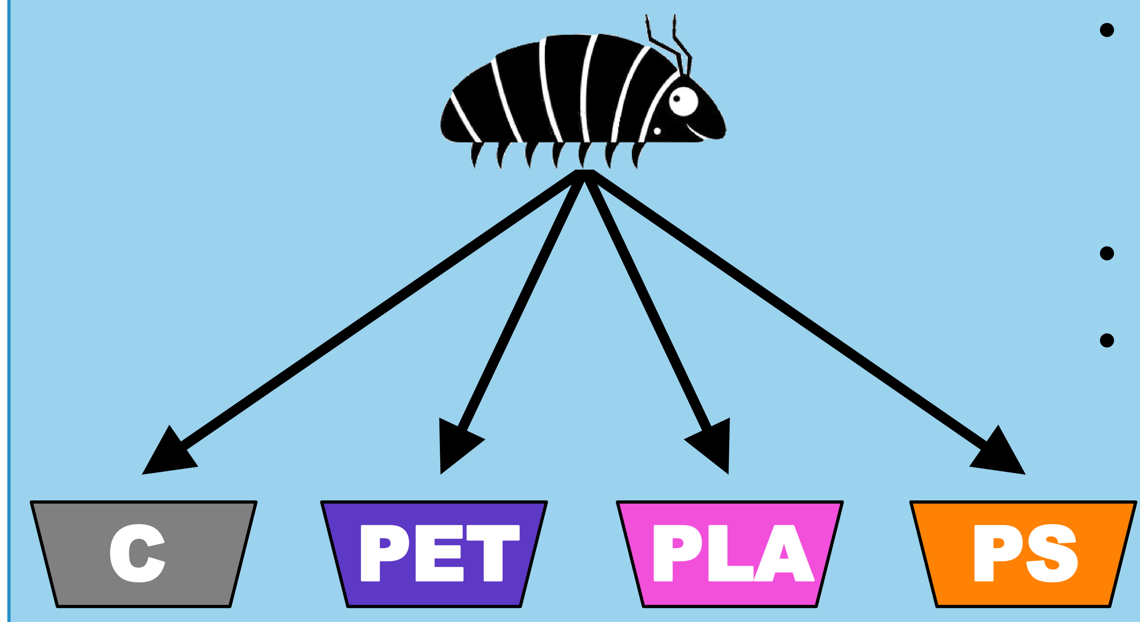
Hypothesis

Biodegradable (PLA) and non-biodegradable (PET and PS) MP have contrasting effects on *P. scaber* and its gut microbiome

Aim of the study

To assess the effects of common MP polymers (PET, PLA and PS) on the fitness of the soil-dwelling woodlouse *P. scaber* and the associated gut microbiome

Methods



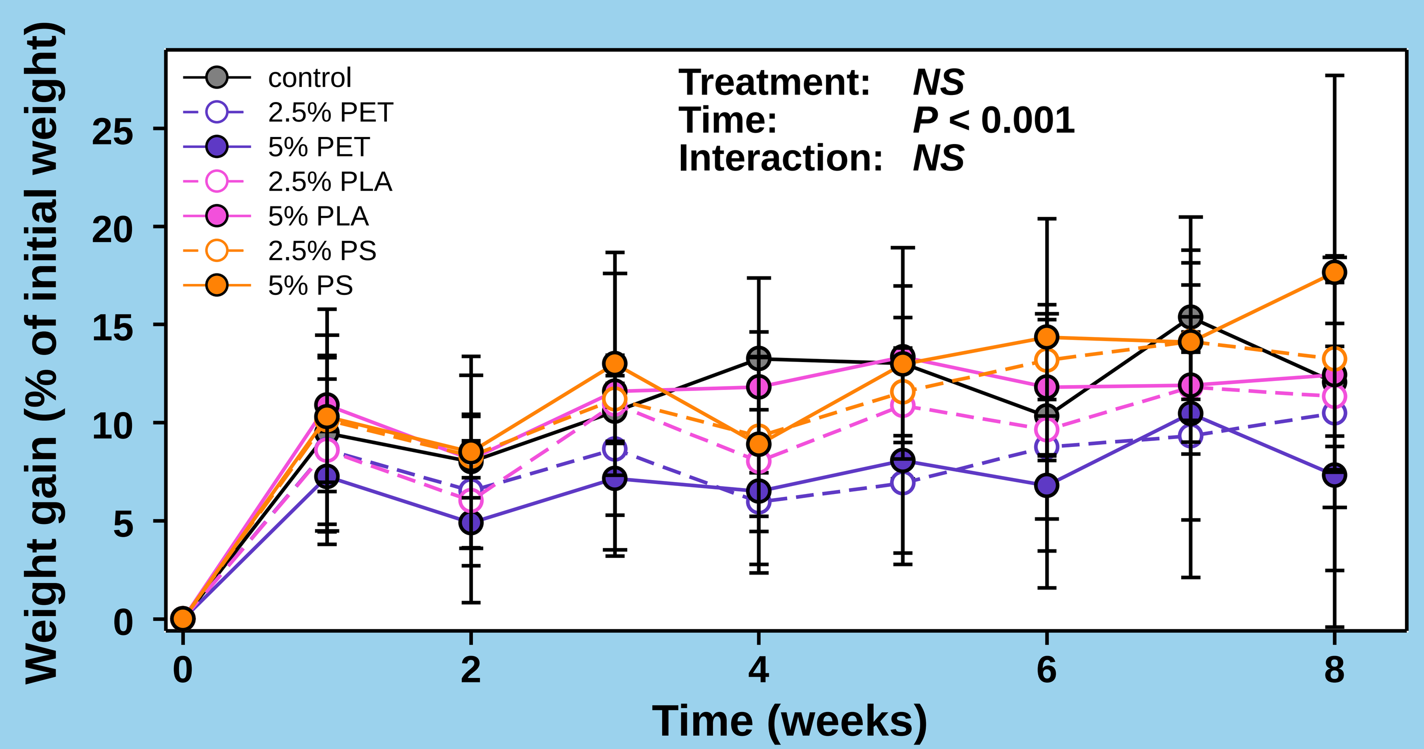
- Fitness of *P. scaber* after ingestion
  - ➔ Growth
  - ➔ Running speed
- Food choice of *P. scaber*
- Gut microbiome of *P. scaber*
  - ➔ Growth
  - ➔ Metabolic activity
  - ➔ Trancriptional activity
  - ➔ Diversity

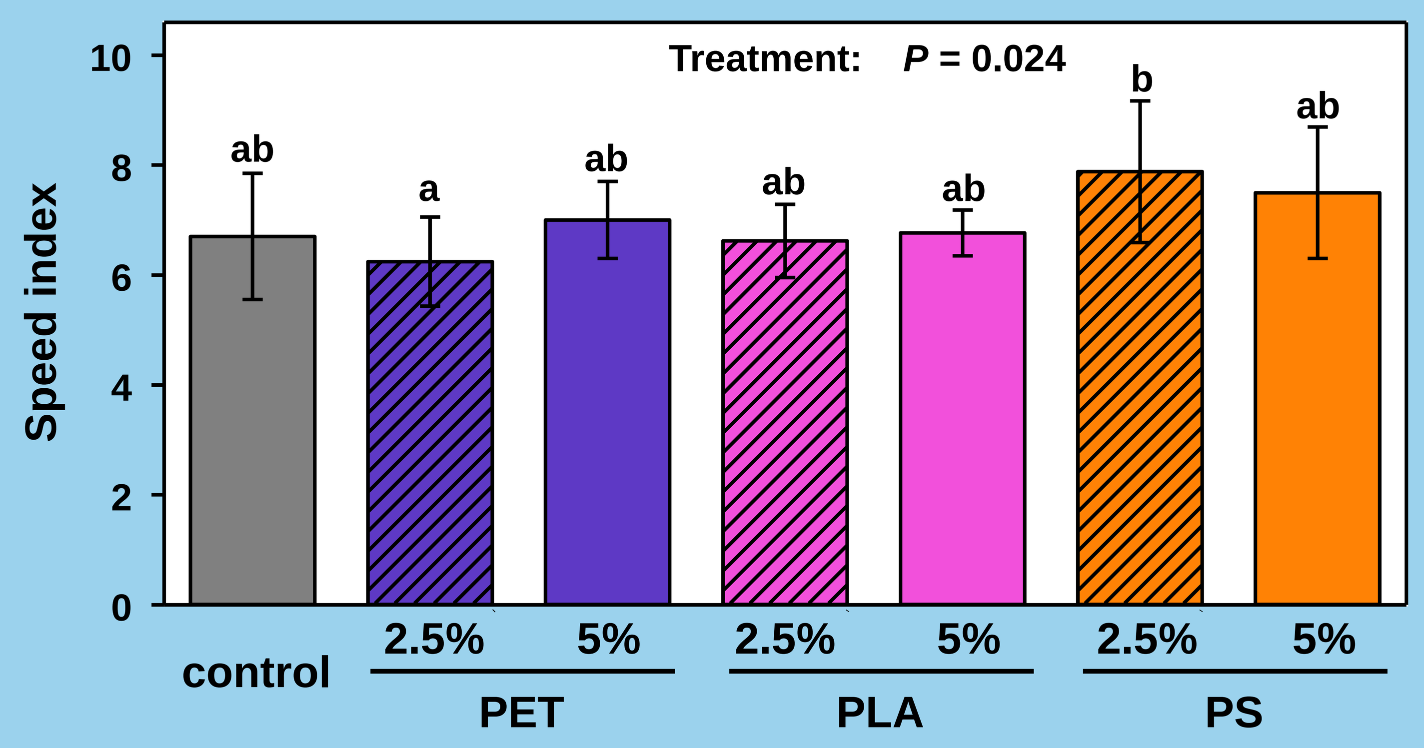
Summary and conclusions

- *P. scaber* is widely unaffected by MP reflecting **resilience of adult woodlice**
- Food containing **PS** is **less preferable**
- Woodlice are a **source of hydrogen** in oxic environments
- **Positive effect of PLA** on the activity of the gut microbiome likely due to **hydrolysis and fermentation of lactic acid**
- **PET** and **PS** ingestion leads to **negative effects on fermentation**

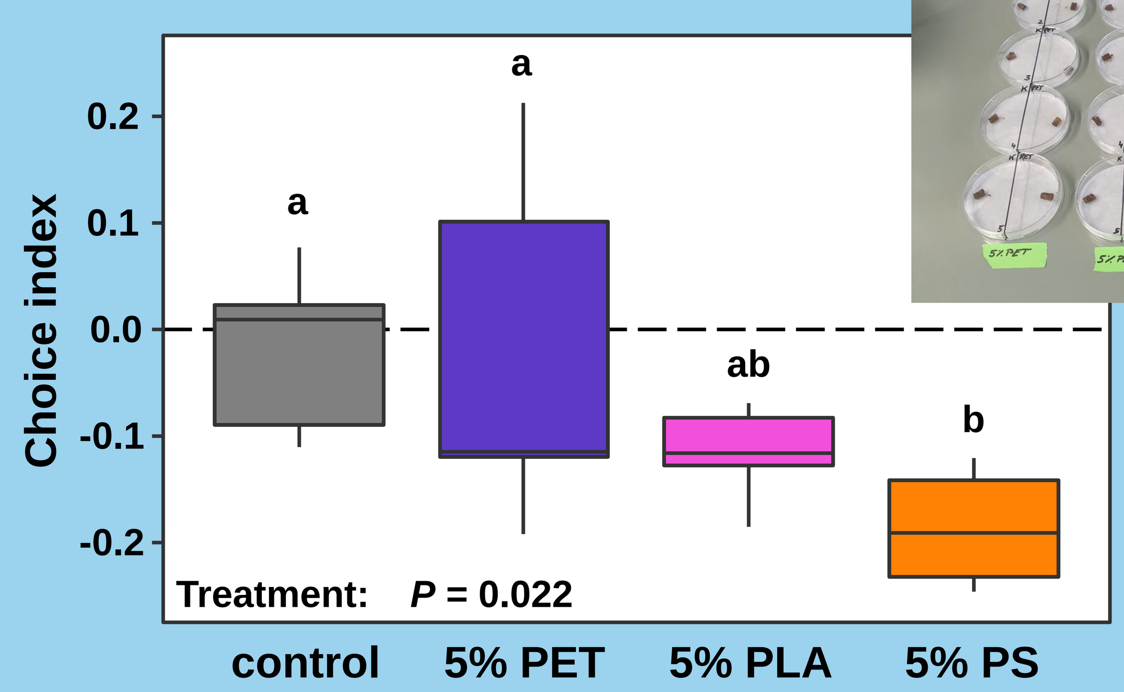
Results

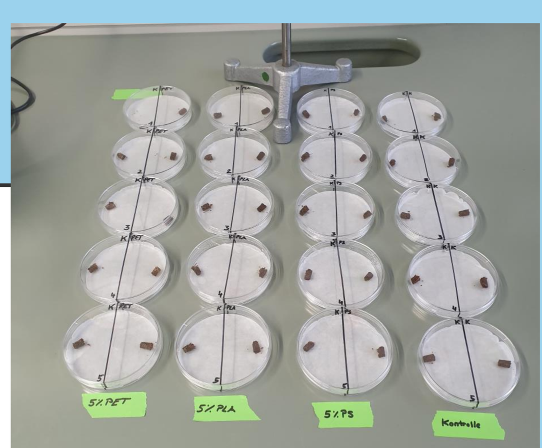
Resilience of adult woodlice



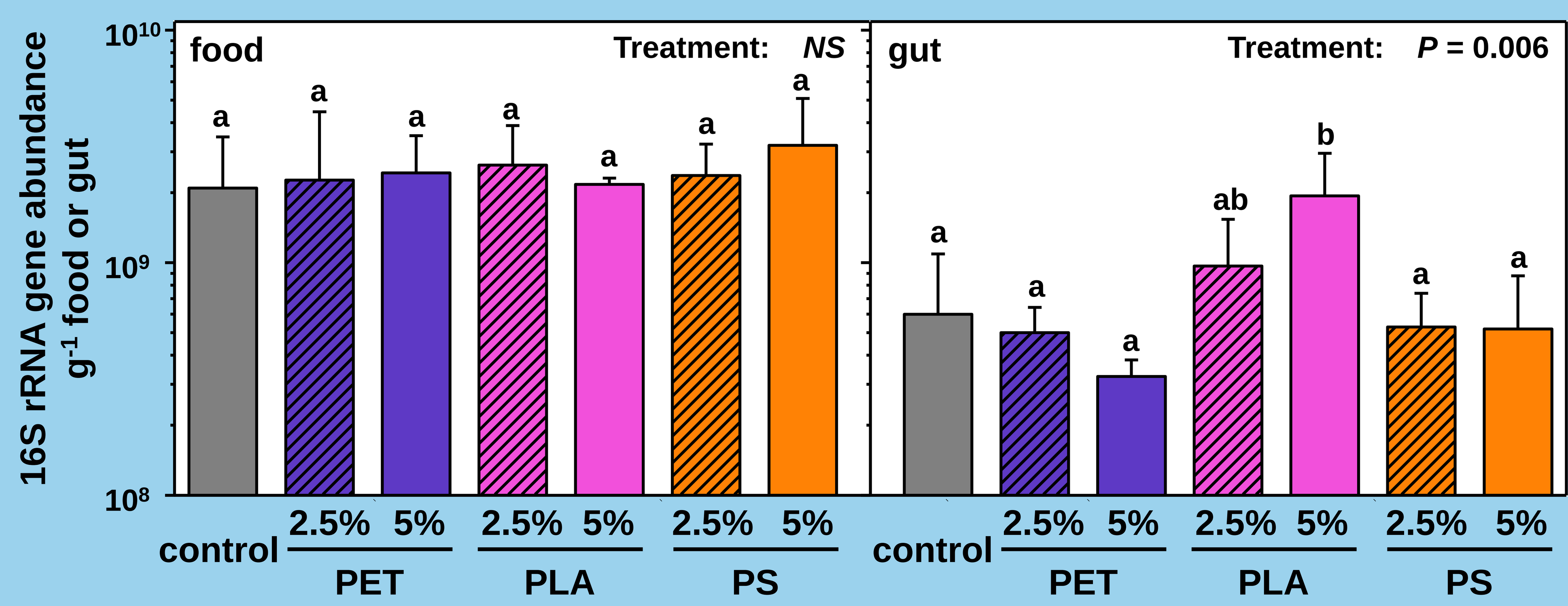


Avoidance of PS



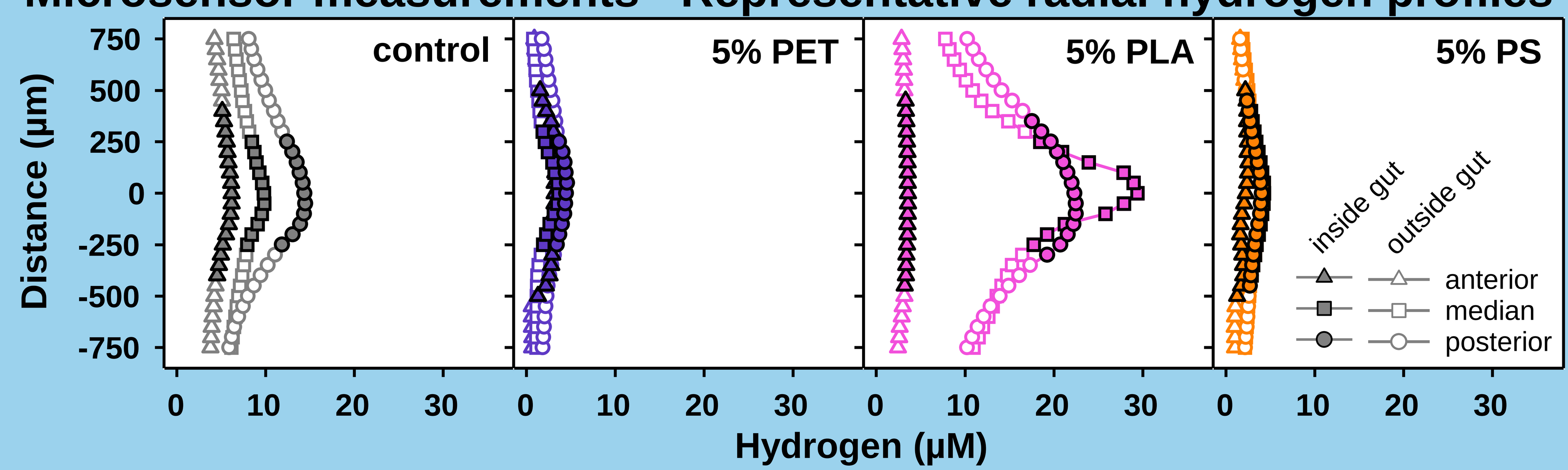


Microbial growth in the gut

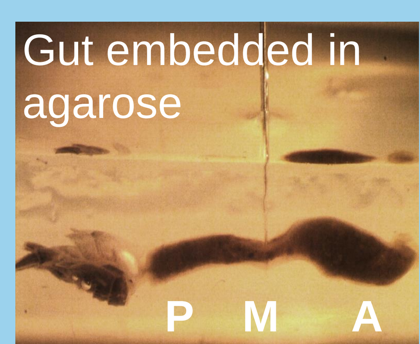


Microbial activity in the gut

Microsensor measurements - Representative radial hydrogen profiles



position	max. hydrogen concentration (µM)			
	Control	5% PET	5% PLA	5% PS
anterior	4.6 (1.6)ab	3.4 (1.0)ab	6.7 (3.4)ab	4.0 (1.0)ab
median	7.9 (1.8)bc	2.6 (0.9)a	30.5 (3.7)d	5.0 (0.7)ab
posterior	17.2 (3.8)cd	5.1 (2.3)ab	24.0 (11.6)d	4.3 (2.7)ab



Further microsensor measurements: oxygen and pH
➔ Anoxia and acidic pH (~5.6) determined for all guts

Coming soon...

- Quantification of short chain fatty acids in the gut
- Analysis of microbial community composition and transcriptionally active taxa in the gut

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