

# Where does the plastic go - can benthic animals remove plastics from the environment?

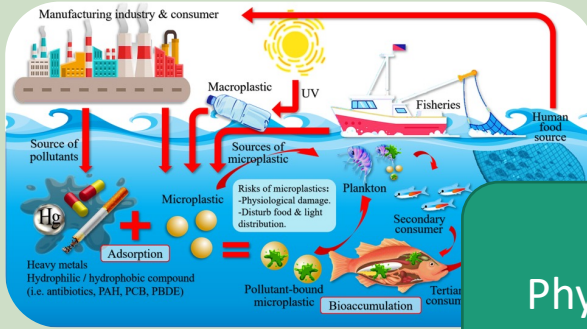
Felicitas ten Brink

Immerse TEEL breakout session II session 3

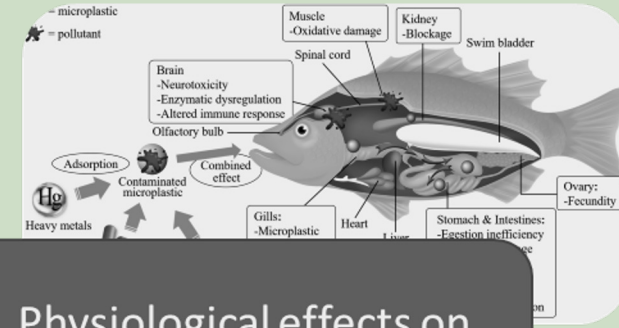
Understanding the interactions between Biota and pollutants



# “Marine invertebrates are abundant, and we know they ingest microplastics”



Physical fate of plastics



Physiological effects on animals

Illustrations from: Amelia, T.S.M., Khalik, W.M.A.W.M., Ong, M.C. *et al.* Marine microplastics as vectors of major ocean pollutants and its hazards to the marine ecosystem and humans. *Prog Earth Planet Sci* 8, 12 (2021).

Egestion

Bio-packaging

Burial

Higher concentration of MP in sediments

Removal of MP from the water column

## Challenge:

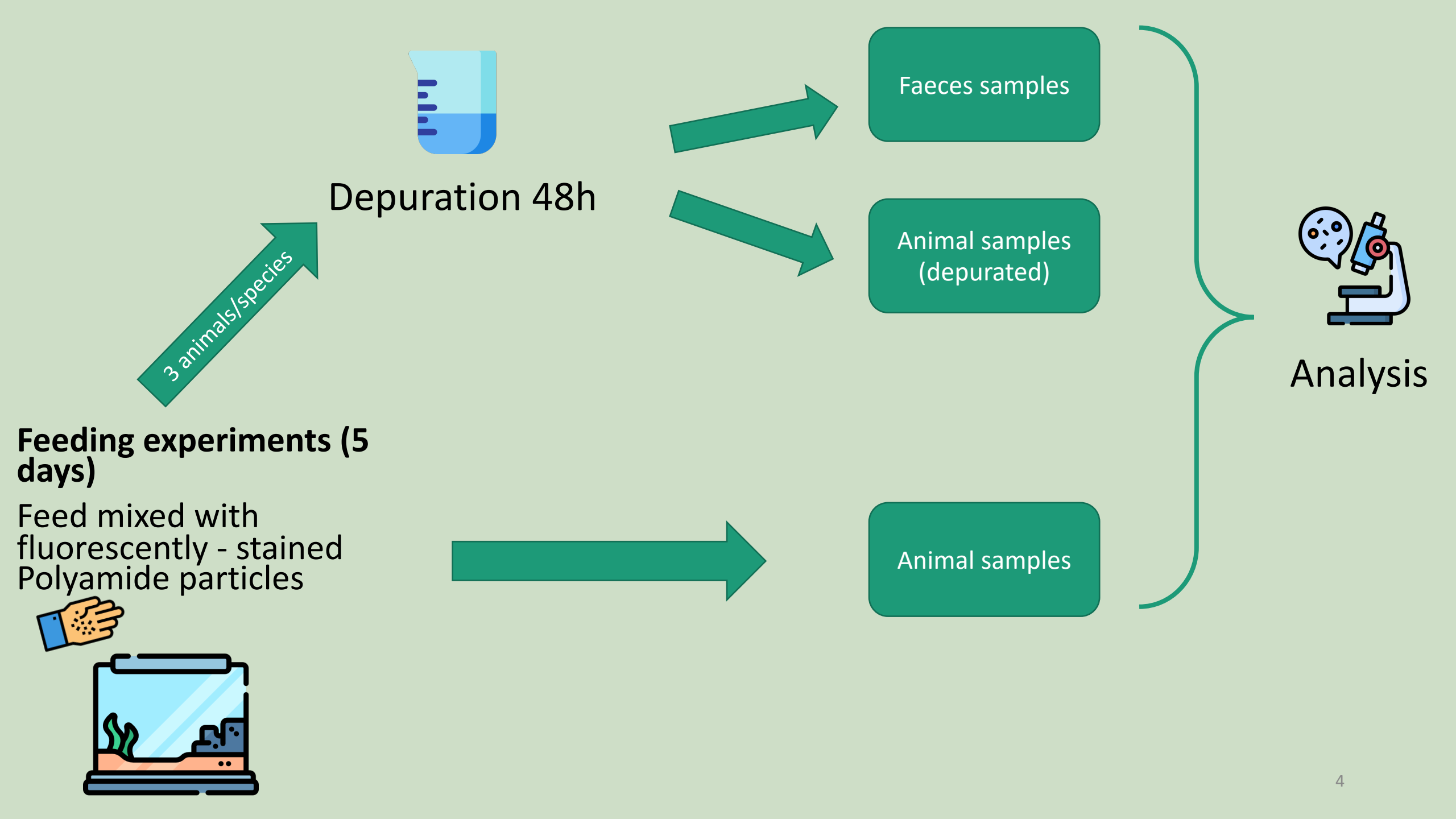
Understanding the interactions between biota and microplastic pollution

### 1. If and how benthic organisms extract MP from the water column and sediment

Are they ingested and retained? Or egested?  
How do species with different feeding and burial modes differ?

### 2. Which mechanisms promote burial and retention of MP ?

Are the MP transported into different sediment depths?



## Sandy scenarios



Cockle



Lugworm



## Muddy scenarios



Pepper Shell



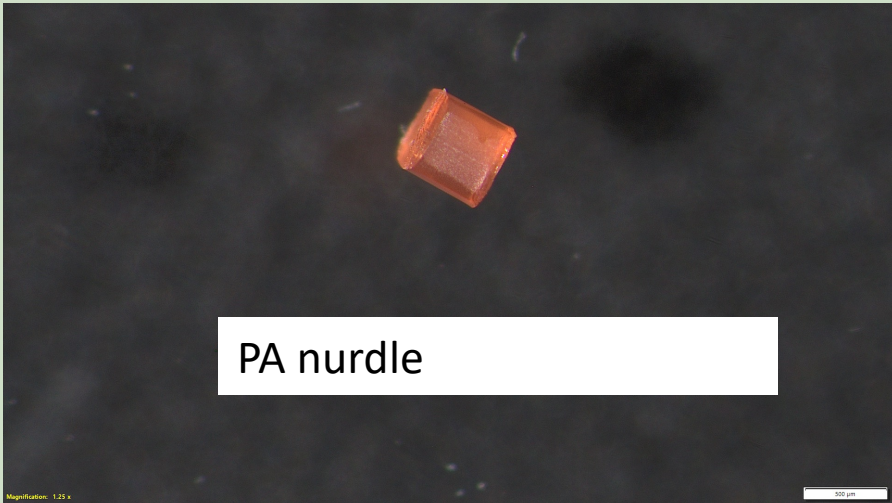
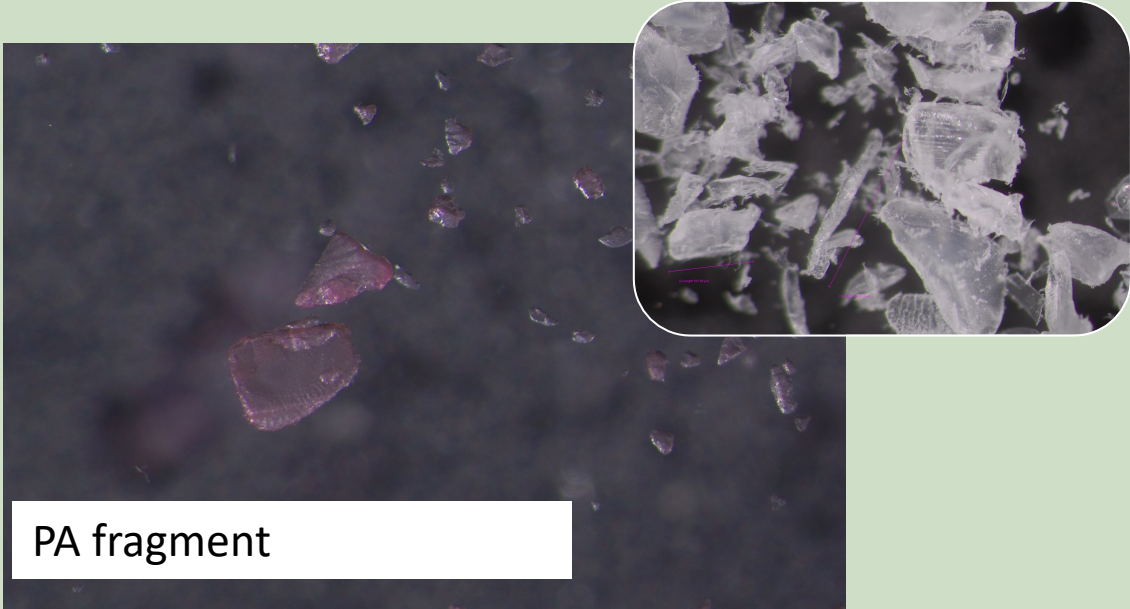
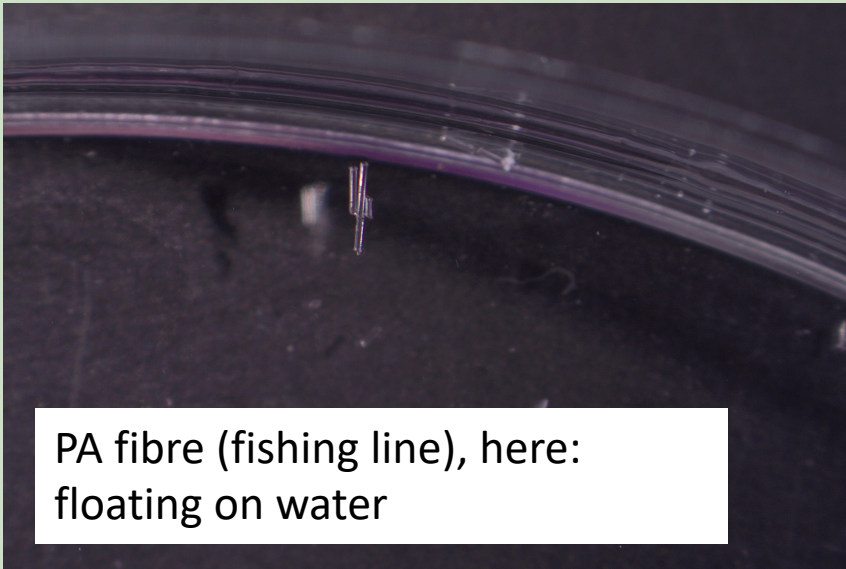
Ragworm







# Virgin MP added during the experiment



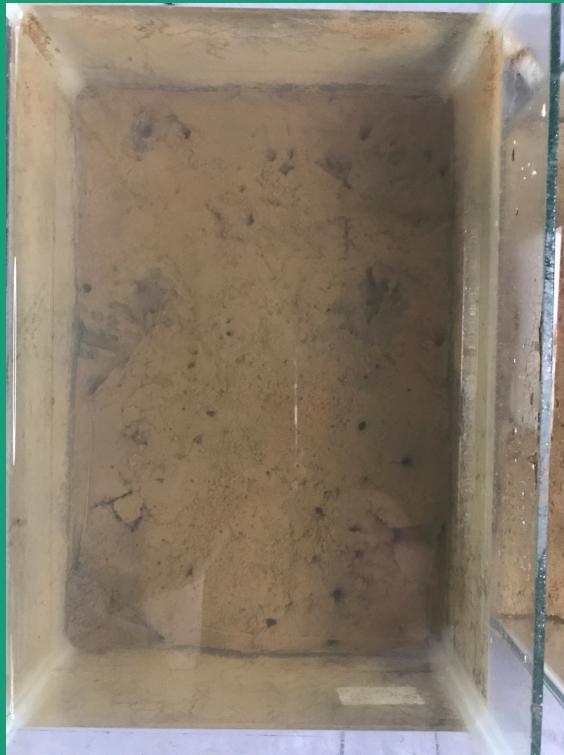


# First observations: Bioturbation and burial

Day 1



Day 6



Day 1



Day 6

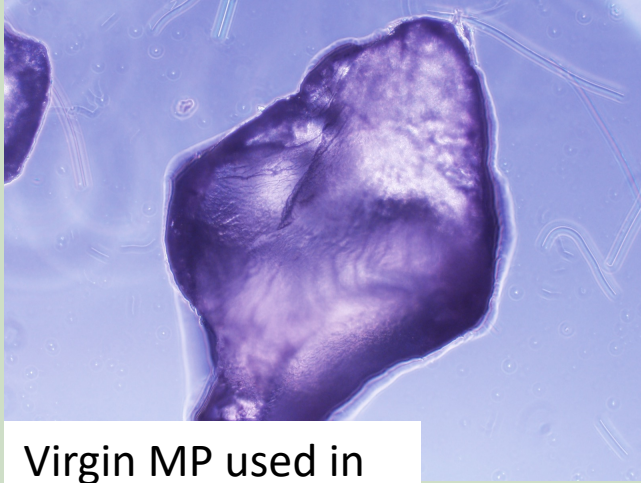




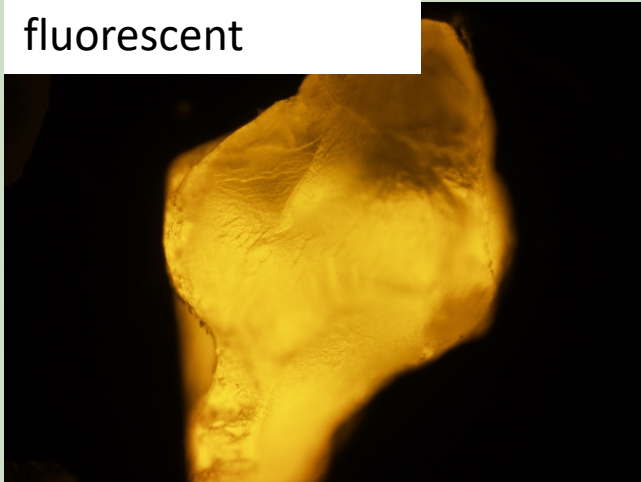




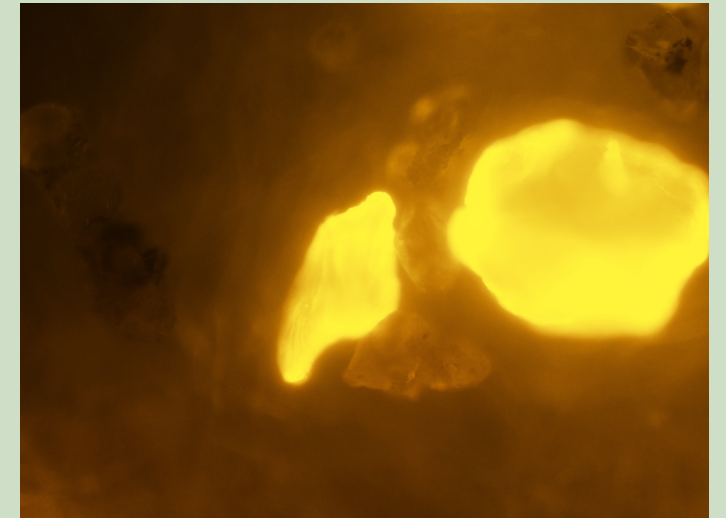
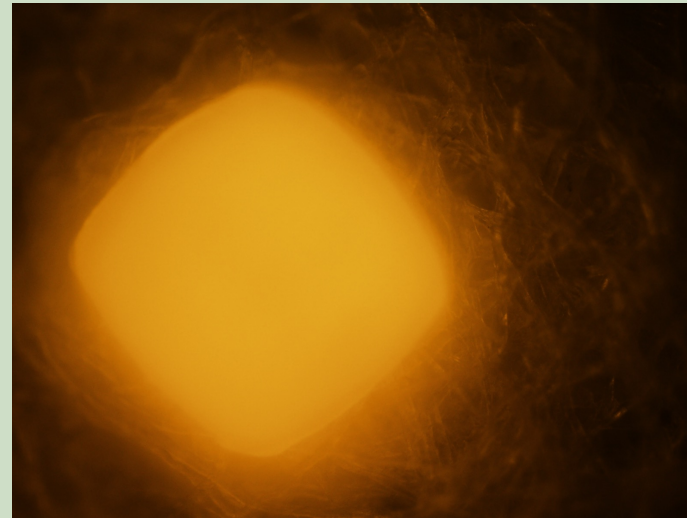
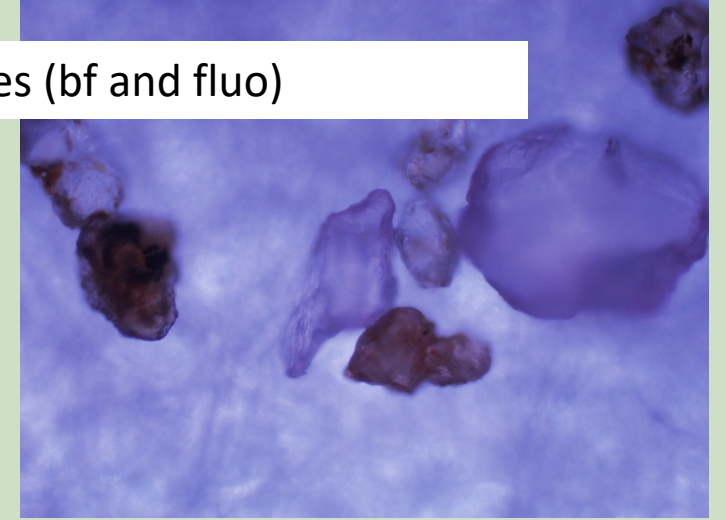
# Analysis: Identification using fluorescent microscope



Virgin MP used in experiment bright field and fluorescent



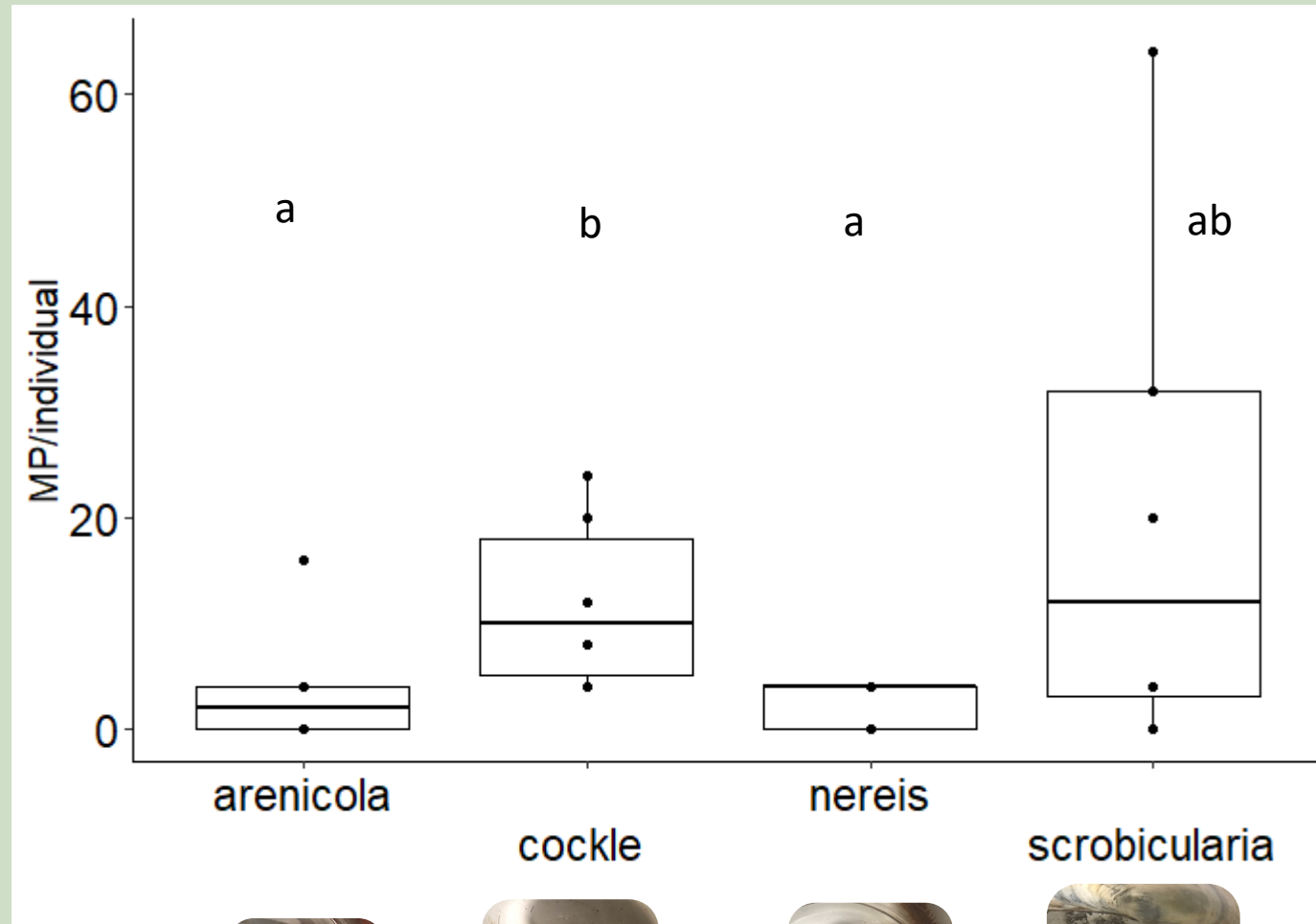
MP found in samples (bf and fluo)



# Results

Sand

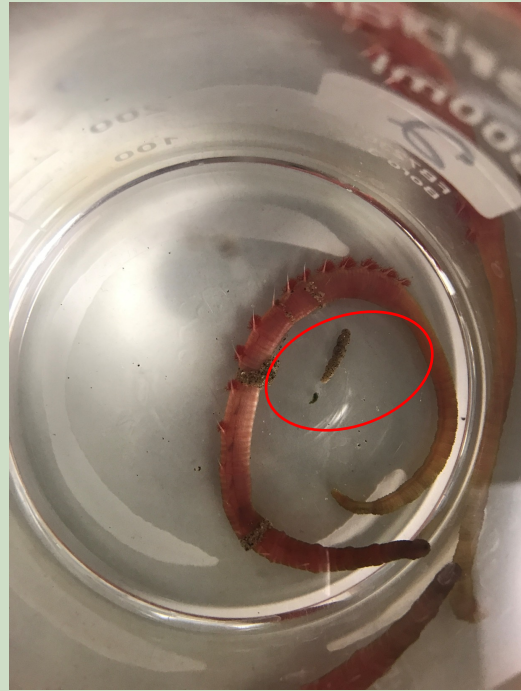
Mud



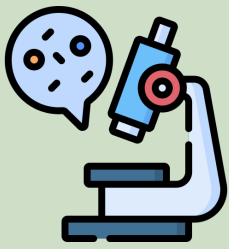


# What happens after ingestion?

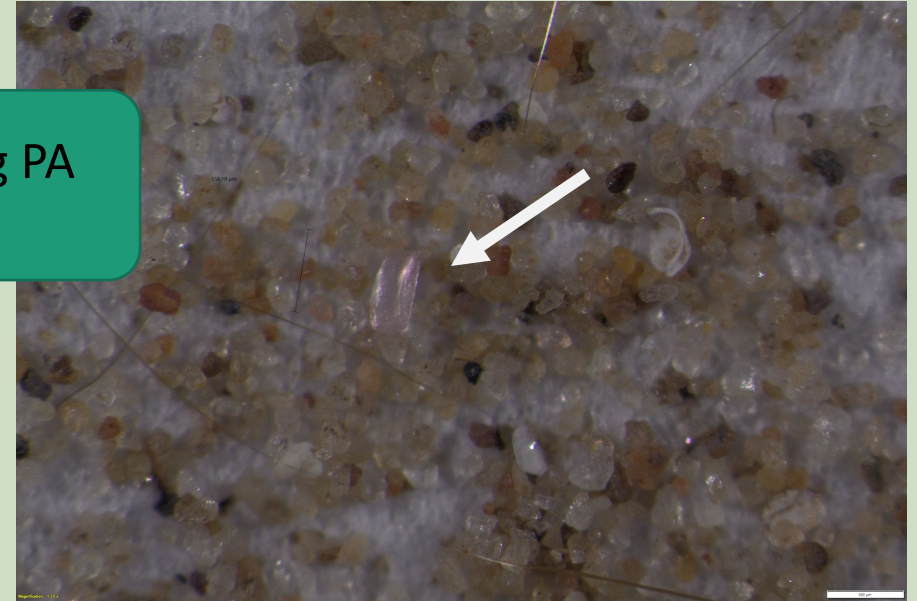
Animal depuration and collection of faeces





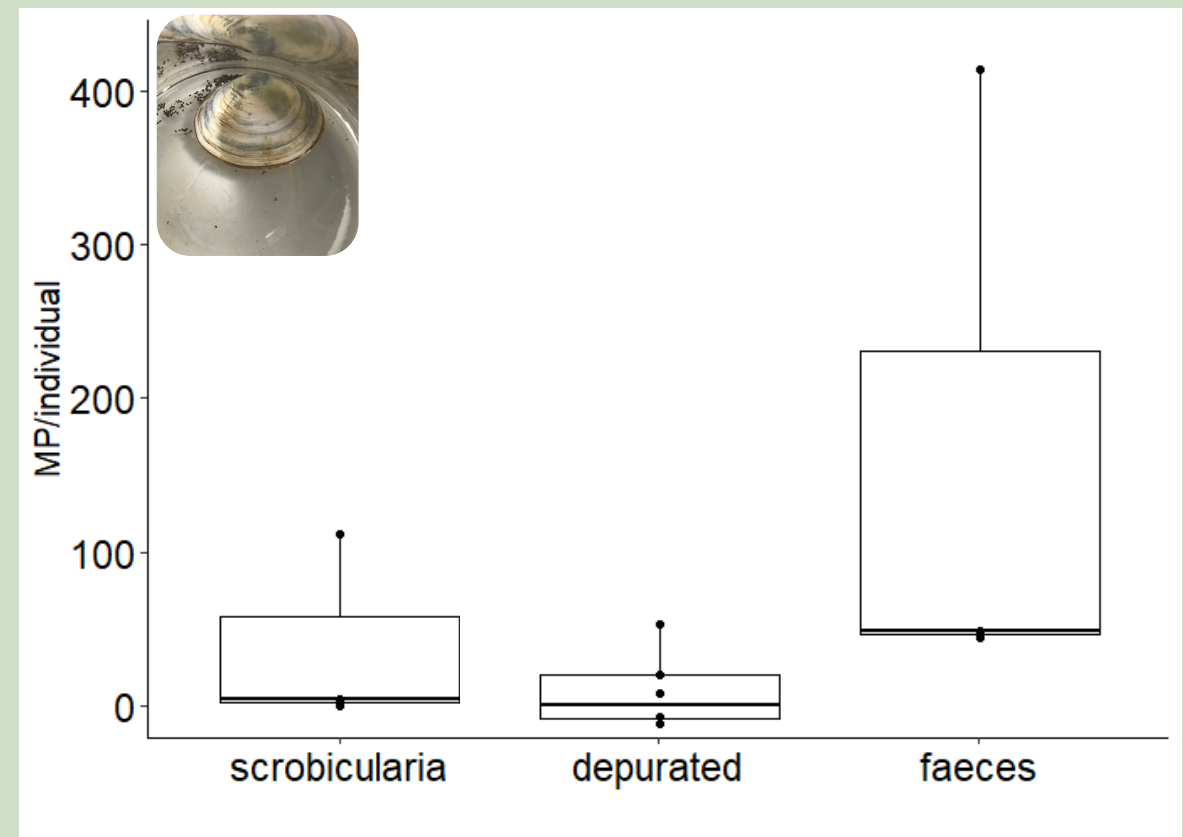
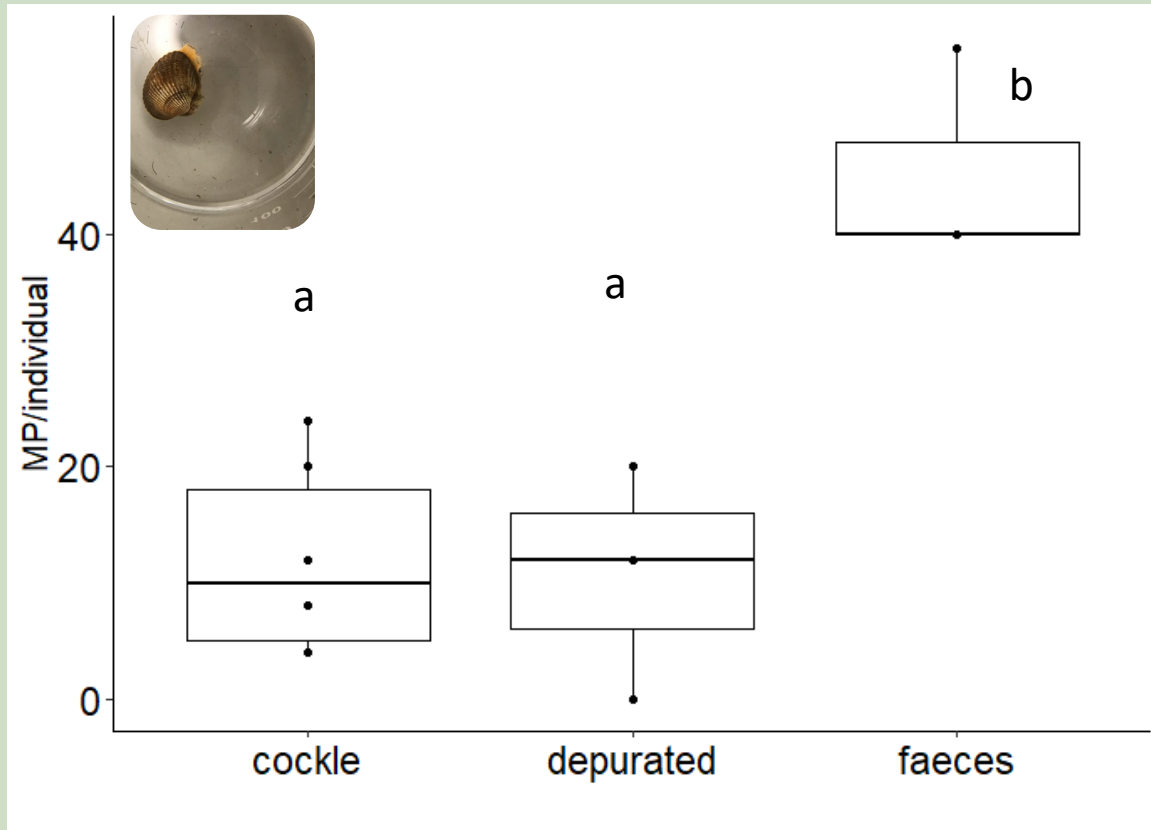


Faeces containing PA fragments



Faeces containing nurdle

# Results



# Discussion

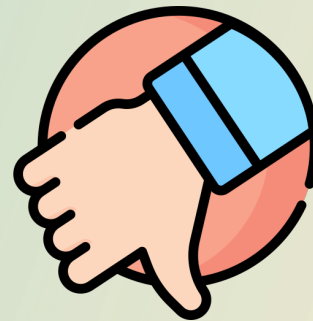
Size can influence  
bioavailability

Comparison with field data:  
they are a snapshot in time

Interaction with other  
persistent pollutants



What assumptions and species traits need to be true so we could use benthic invertebrates as a tool to remove plastic?



Should we?

# Thank you for your attention

