

# Trophic transfer increases the exposure to microplastics in littoral predators

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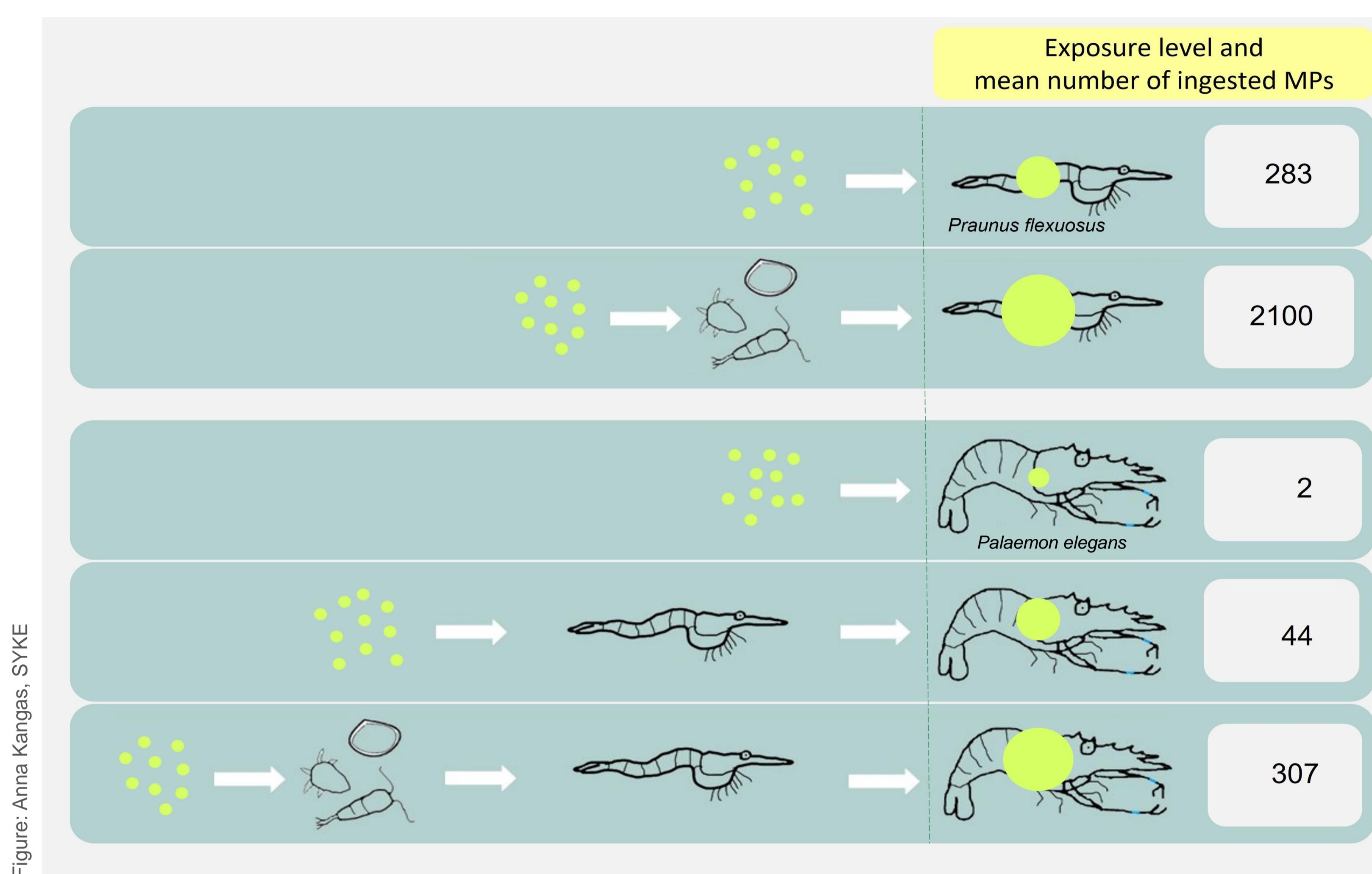


Figure: Anna Kangas, SYKE

Trophic transfer plays an important role in predator microplastic (MP) exposure.

- Trophic transfer of MP occurred up to the third trophic level.
- Predators ingested >200 times more MPs through prey than directly from water.

Microplastics are widely present in coastal ecosystems including littoral zone and they can be ingested by numerous marine animals. The aim of this study was to examine MP trophic transfer and predator exposure along food chains of different lengths.

## Material and methods

Fluorescent 10 µm polystyrene microspheres were used as microplastic tracer particles. Animals at the lowest trophic level were exposed to MPs at the concentration of 2000 particles/ml.

Experiments were conducted with common littoral animals of the Northern Baltic Sea; zooplankton, and two crustacean species, the chameleon shrimp (*Praunus flexuosus*, a mysid) and the rockpool prawn (*Palaemon elegans*, a decapod).

Ingested MPs were detected with an epifluorescence microscope (Leica DMIL).

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## Results

All studied taxa ingested MPs.

The number of ingested MP increased with food chain length.

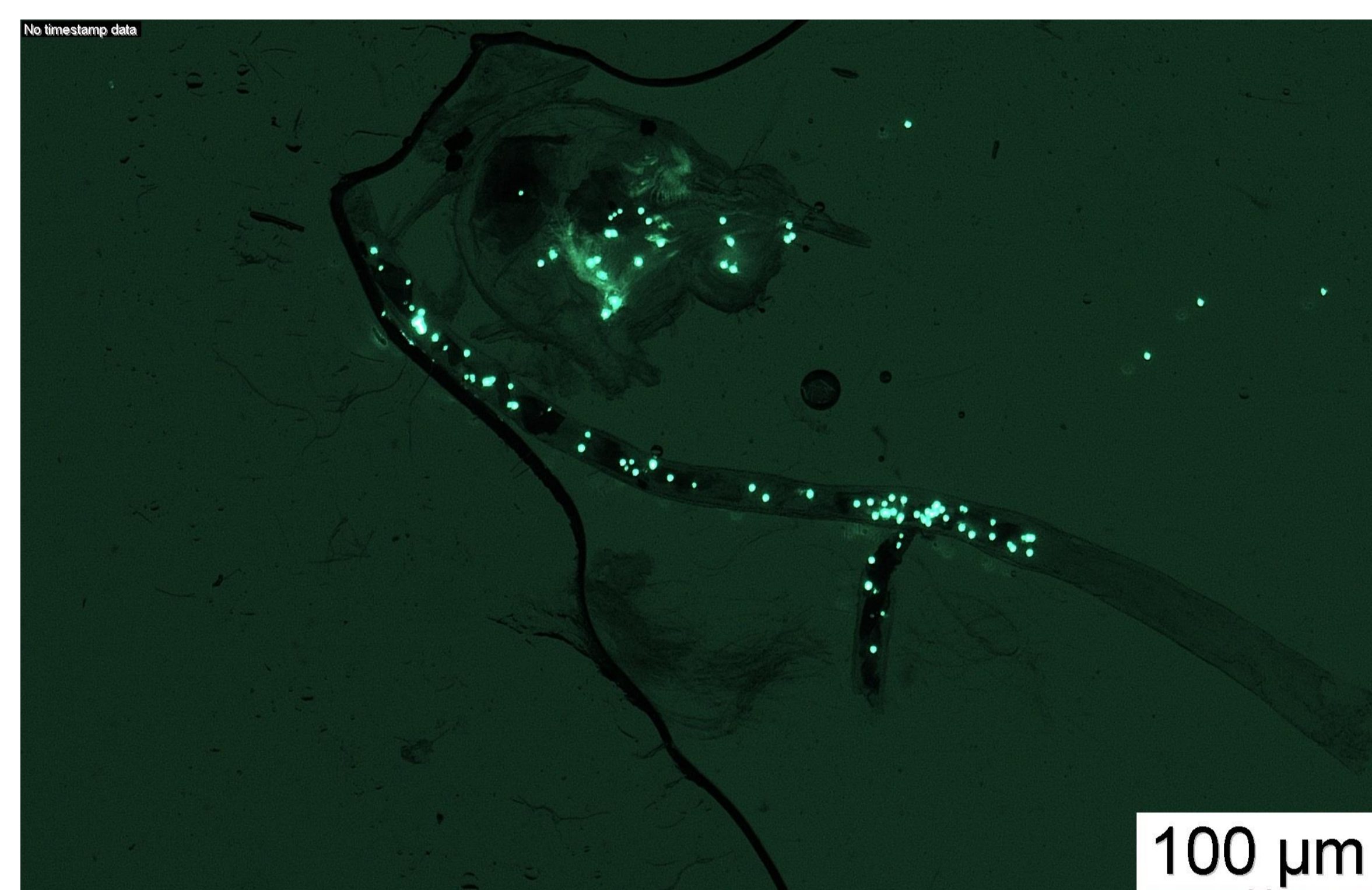
For both chameleon shrimp and rockpool prawn the lowest MP ingestion was observed in the direct exposure experiments.

## Discussion and conclusions

Through trophic transfer predators may be exposed to MPs they wouldn't typically prey on.

The extent of direct exposure from water is affected by the feeding mode, as filter and suspension feeders (zooplankton and chameleon shrimp) ingested more microspheres than the predator (rockpool prawn).

Trophic transfer may be an important pathway for predator MP exposure in highly polluted areas.



Fluorescence microbeads in a bowel and a stomach of a chameleon shrimp.

Picture: Anna Kangas, SYKE

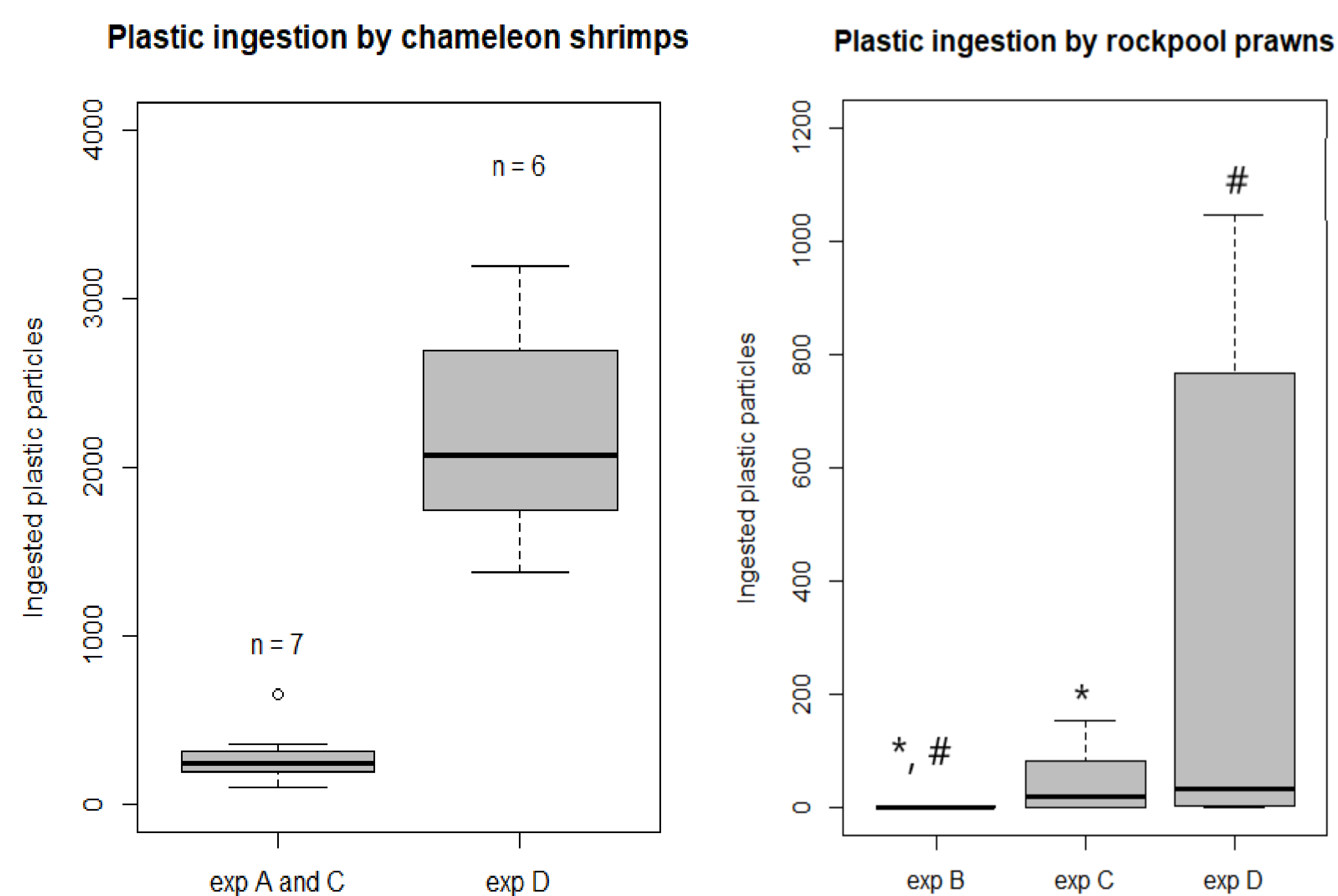


Figure: Plastic ingestion of chameleon shrimp (*Praunus flexuosus*) and rockpool prawn (*Palaemon elegans*). Experiment codes: A = Direct exposure of chameleon shrimp, B = Direct exposure of rockpool prawn, C = Two-step transfer, D = Three-step transfer