**Are microplastics inhibitory to *Daphnia magna* and**

**are they significant vectors for hydrophobic organic pollutants?**

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The presence of microplastics in aquatic ecosystems is of increasing global concern. Ingestion of microplastics may result in adverse effects in aquatic organisms, and microplastics may increase exposure to harmful chemicals by serving as vectors for hydrophobic pollutants. This study investigated: i. the amount of regular and irregular shaped microplastics ingested and egested by the filter feeder *Daphnia magna* during exposure and gut clearance; ii. the adverse effect of microplastic with and without sorbed phenanthrene; and iii. the significance of phenanthrene sorption by microplastic compared to sorption by naturally occurring plankton organisms (bacteria, yeast and algae).

*Daphnia magna* rapidly ingested regular shaped microplastic beads (10-106 µm) and irregular shaped microplastic fragments (10-75 µm) with uptake rates between 0.7 and 50 plastic particles/animal/day. Microplastic exposure concentrations ranged between 0.0001 and 10 g/L. Gut clearance was slower and apparent gut residence time was longer for irregular shaped microplastic fragments compared to regular shaped microplastic beads. The acute inhibitory effect of irregular shaped microplastic fragments was also more pronounced with an EC50 (48 h) value of 0.065 g/L whereas regular shaped microplastic beads were much less inhibitory. Microplastic morphology is therefore a factor that should be considered when conducting experiments with filter feeders because most environmental microplastics are likely irregular in shape. The potential of microplastic to act as vectors for hydrophobic organic pollutants was examined using [14C]phenanthrene as tracer. Radioactivity measurements showed that polyethylene microplastic particles sorbed less [14C]phenanthrene compared to natural plankton organisms (bacteria, yeast and algae). The abundance of phytoplankton and bacterioplankton is often much greater in aquatic ecosystems than the present concentrations of microplastic particles. Hence, live and dead plankton organisms are likely more critical carriers of hydrophobic pollutants than microplastics. This suggests a more limited role of microplastics as significant aquatic vectors for hydrophobic pollutants under current environmental conditions.

**Keywords:** *Daphnia magna*; polyethylene microplastics; phenanthrene; sorption; toxicity

**Session:**

1.6 Ecotoxicology of micro and nanoplastics: Mechanistic approaches to understand their risk for the environment and human health (Francisca Fernandez-Piñas, Roberto Rosal, Miguel Gonzalez Pleiter)

~~3.16 Microplastics in freshwater and terrestrial systems – fate, monitoring and biological interactions (Ana Marta Gonçalves, Nelson Abrantes, Alice A. Horton, Claus Svendsen)~~