

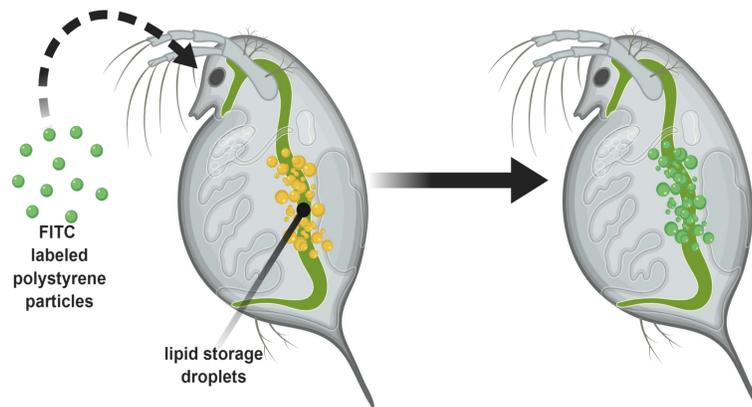
The translocation of microplastics to lipid droplets of *Daphnia magna* is an artefact

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Background

- Translocation of nano- and microplastics across biological barriers has toxicological relevance^[1]
- Earlier studies reported translocation of fluorescent nano- and microplastic (20 nm and 1000 nm) particles to the lipid droplets of *Daphnia magna*^[2]
- A plausible biological mechanism is currently lacking

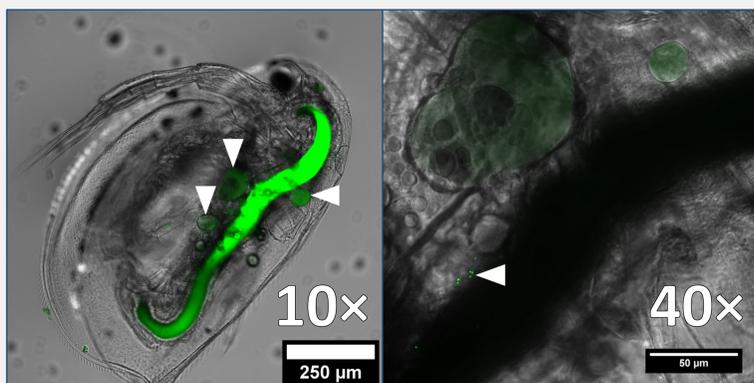


Conclusion

- We could not replicate the findings of the most prominent tissue translocation study^[2] with *Daphnia magna*^[3] (not shown)
- The reported tissue translocation of 1 μm particles is an artefact
- Lipophilic fluorescent dye (FITC) leaches from particles and accumulates in lipid droplets
- Fluorescence should not stand alone to study translocation

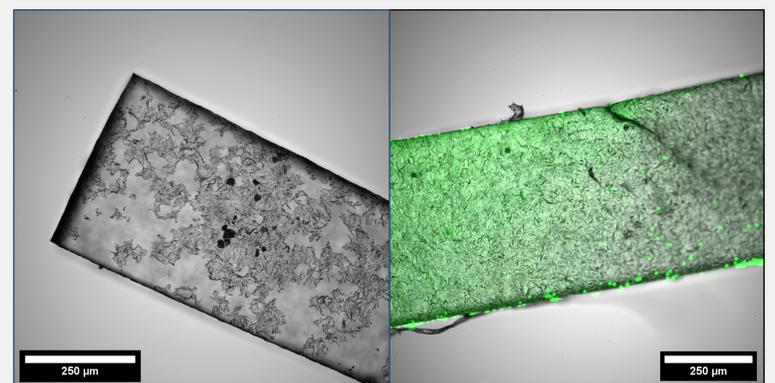
Replication attempt

- Exposure to 2 $\mu\text{g L}^{-1}$ PS nano- and microplastics (20 nm and 1000 nm) did not result in fluorescence outside the digestive system
 - \rightarrow original study^[2] not reproducible
 - Exposure 1000 \times higher concentration (2 mg L^{-1}) resulted in fluorescence signal in lipid droplets and the gut (left)
 - Higher magnification of regions of interest shows that 1000 nm microplastics and fluorescence do not co-localize (right)
- \rightarrow appears to be an artefact of leaching fluorescent dye



Passive sampling

- Medical grade silicone rubber used as passive sampling device (PSD) to confirm leaching of the dye
- PSD exposed to particles for 24 h
- Shows that fluorescence partitions to silicone rubber \rightarrow fluorescent dye leaches from the nano- and microplastics and accumulates in hydrophobic compartments



Control

Exposure

References

- [1] Triebkorn et al., 2018. "Relevance of nano- and microplastics for freshwater ecosystems: a critical review". Trends in Analytical Chemistry.
[2] Rosenkranz et al., 2009. "A comparison of nanoparticle and fine particle uptake by *Daphnia magna*". Environmental Toxicology and Chemistry.
[3] Schür et al., 2019. "When fluorescence is not a particle: the tissue translocation of microplastics in *Daphnia magna* seems an artifact". Environmental Toxicology and Chemistry.

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