

Can plastic litter make food distasteful for an aquatic organism?

Background

Environmental pollution with plastics, especially microplastics, has attracted considerable interest from the research community as well as the wider public. This interest has resulted in a dedicated effort to examine, quantify, and describe the occurrence of plastic pollution around the globe. Indeed, regardless of where we look, we find plastics. Nonetheless, it remains largely unclear what the impacts of environmental plastic pollution for organisms is. For this reason, there has recently been a call to move the plastic pollution science from a state of reporting (*i.e.* “how much and what plastic is there?”) to a state of tackling questions about the “so what?” and “what if?” (e.g. Borja and Elliott, 2019). The scientific debate about the potential impacts of plastics is therefore far from settled (“Much ado about nothing?” in the debate between Backhaus and Wagner, 2019), and therefore, this field offers a diverse range of avenues to explore.

A crucial step in determining impacts of plastics is to study how they may interfere with food uptake in animals. Recent research has shown how scent given off by plastics can mislead fish, birds and turtles to ingest plastics (Pfaller et al., 2020; Savoca et al., 2017, 2016). It is also known that plastics can leach chemicals to the environment, potentially changing the attractiveness of natural food. As there are several types of different plastic polymers, such interactions and effects are expected to vary greatly.



Figure 1. A pre-copula pair of the amphipod *Gammarus fossarum*.

Aims

The aim of the project is to examine how various plastic types (e.g. polyethylene and polyvinyl chloride) could be interacting with natural food, therefore affecting feeding rates of an animal. To investigate the latter, food choice experiments will be conducted using amphipods (fig. 1), following the set-up in Bundschuh et al. (2009). Amphipods are a common crustacean in fresh waters, where they perform critical ecosystem functions, such as decomposition of organic matter. These animals have also been used as sentinel species to monitor water quality with respect to other chemical contaminants, and are therefore a relevant animal model to work with. By studying how plastics could be interacting with a common species through their feeding, you can thus help pushing environmental plastic pollution science towards the currently severely understudied “so what?” and “what if?” questions.

Procedures and Methods

Depending on the exact design of the study (there will be plenty of room for creativity), involved procedures and methods can encompass animal husbandry in the laboratory, measuring respiration rates

of the amphipods, as well as artificial ageing/weathering of plastics, and assessing the degradation state using Fourier-transform infrared spectroscopy (FTIR). The latter is a commonly used technique to identify chemical substances

What we offer

To fulfill the proposed project, the prospective student is offered close mentoring and inclusion into an interdisciplinary and interactive team. The team has a track record in working with microplastics and amphipods (Blarer and Burkhardt-Holm, 2016; Straub et al., 2017), as well as FTIR (see further research: <https://mgu.unibas.ch/en/research/anthropogenic-pollution-of-the-environment/>). Access to necessary facilities, including office space and computer, as well as laboratory and aquaria room will be provided. With a successful completion of the project, we also strongly support the student to publish their research in an academic journal, as demonstrated with past students (Blarer and Burkhardt-Holm, 2016; Bosshart et al., 2020; Mani et al., 2015; Straub et al., 2017), thus bolstering the student's career prospects in academia.

Your profile

Even though a background in natural sciences is not strictly necessary, such a background would be beneficial. You should further enjoy working both, systematically and carefully and be eager to explore the scientific literature on the topic and acquire knowledge independently. Please also consider that the project involves experiments with animals, and you should be willing to carry these out.

If your interest is peaked, please contact:

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References

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