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Understanding interactions between (micro)plastics and mosquitoes: An interdisciplinary approach in Montpellier, France

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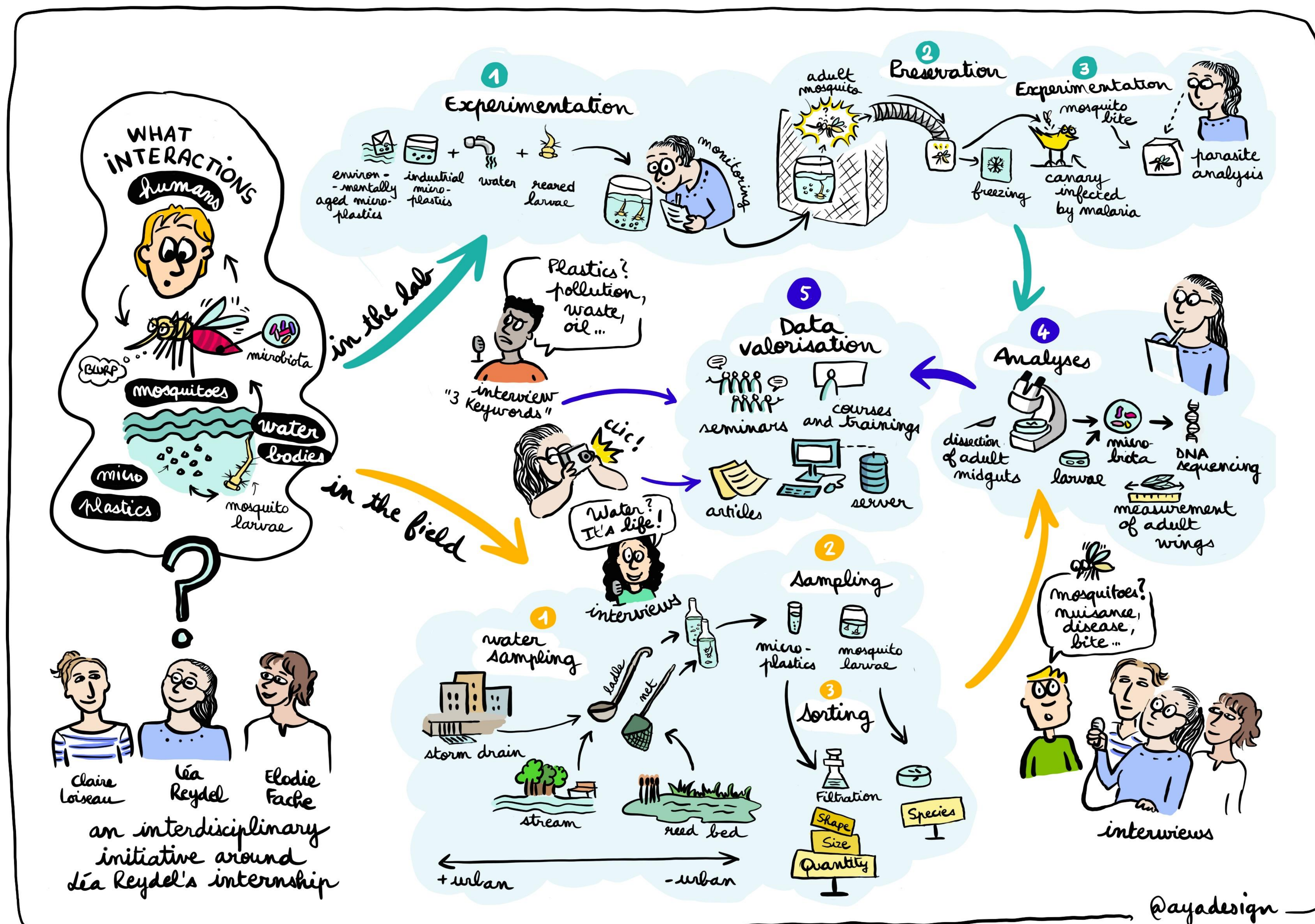
Introduction

Today, plastic pollution is ubiquitous. The fragmentation and degradation of macroplastics generate microplastics, which are known for their direct toxicity and harmful impact, but can also act as carriers of contaminants and pathogens¹. Microplastics are known to threaten numerous organisms across ecosystems, potentially impacting also mosquitoes. So far, a few studies have shown an ontogenetic transfer of microplastics from larvae to adults in mosquitoes², but the characterization of microplastics present in the water of larval habitats has never been carried out³. Moreover, the effects of microplastics on vectorial capacity have never been experimentally tested.

In this context, a research project aims to untangle the interactions between environmental contexts (urban, peri-urban, and rural settings), microplastic pollution, and the life history traits, microbiota, and vectorial capacity of mosquitoes. This poster presents the project's methods, then places them in the context of social representations of plastic-mosquito interactions, which were explored through semi-structured interviews.



Culex pipiens
© Jean-Baptiste Ferré



“There is nowhere you can go to escape plastic. [...] The world is now plastic.”⁴

Materials & Methods

Figure 1 outlines the laboratory experiments, field sampling, and various analyses conducted as part of Claire Loiseau's ongoing research project on microplastic-mosquito interactions in and around Montpellier, France.

It also highlights the interdisciplinary initiative that arose from this project, which includes participant observations at various stages and semi-structured interviews with 20 individuals. These individuals were selected from the project's core (MIVEGEC lab and the regional mosquito control agency, EID) to its periphery (local representatives, program managers, and reserve officers).

During the interviews, participants were asked to create a drawing or diagram depicting how they understood the connections between mosquitoes, plastics, water bodies, and any other elements they perceived as interacting with these.

Fig.1: Main steps of the research project and of its interdisciplinary extension. Source: Aya Berteaud - Sketchnote based on a workshop with the authors of this poster.

Social representations of plastic-mosquito interactions

In their drawings or diagrams, and throughout the interviews more generally, our interviewees highlighted two main patterns of co-presence:

1. Mosquito larvae and microplastics in various types of (stagnant) water bodies (14 interviewees; e.g., Fig. 2)
2. Mosquito larvae (and sometimes adults) and water in macroplastics, in the environment, laboratory, or insectarium (6 interviewees; e.g., Fig. 3).

In both cases, as macroplastics potentially degrade into microplastics, the ingestion of microplastics by larvae was sometimes explicitly mentioned (e.g., Fig. 4).

From there, a few interviewees highlighted the transfer of microplastics into the food chain, via predators of larvae (mainly fish and birds; Fig. 4).

Some interviewees also mentioned the persistence of microplastics in adult mosquitoes, as well as their potential transfer to another organism through bites (e.g., Fig. 5).

However, only two interviewees raised questions about the impact of microplastics on the vectorial capacity of mosquitoes, which is the cornerstone of the research project as outlined above.

Discussion / Conclusion

This poster provides an insight into different forms and levels of knowledge regarding microplastic-mosquito interactions.

- *In the literature:* Research gaps – and uncertainties! – exist concerning microplastics in larval habitats and their effects on the vectorial capacity.
- *In the project described above:* Ongoing scientific work aims to fill these gaps, but faces inevitable limitations in terms of geography and study species.
- *In interviews (and related drawings or diagrams):* Common sense knowledge is mainly focused on the co-presence of microplastics and mosquitoes, and on the ingestion of the former by larvae and potential persistence in adults; with some questions about the transfer of microplastics from mosquitoes to other organisms, but little concerns about the effects of microplastics on the mosquitoes' vectorial capacity.

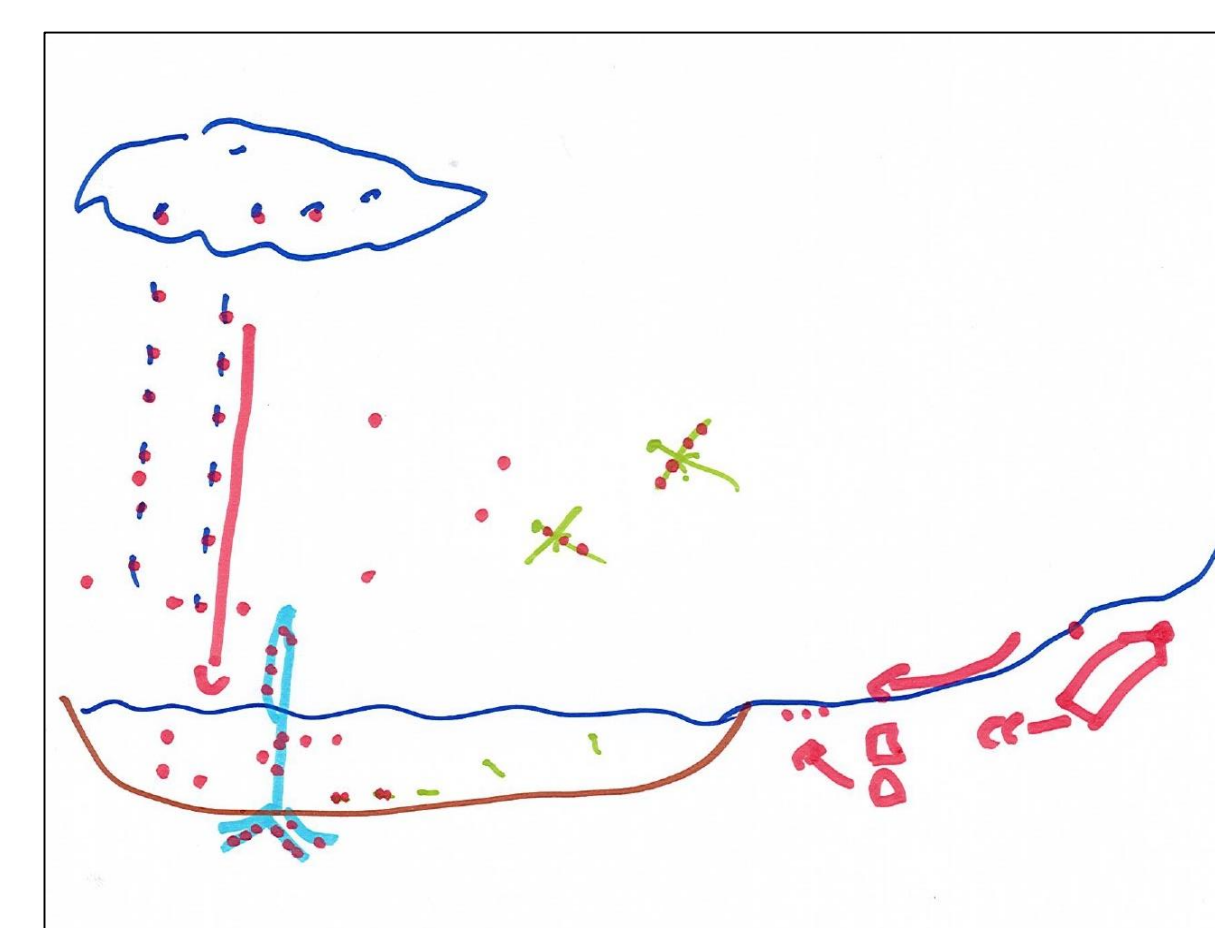


Fig.2: Mosquito larvae and microplastics in water

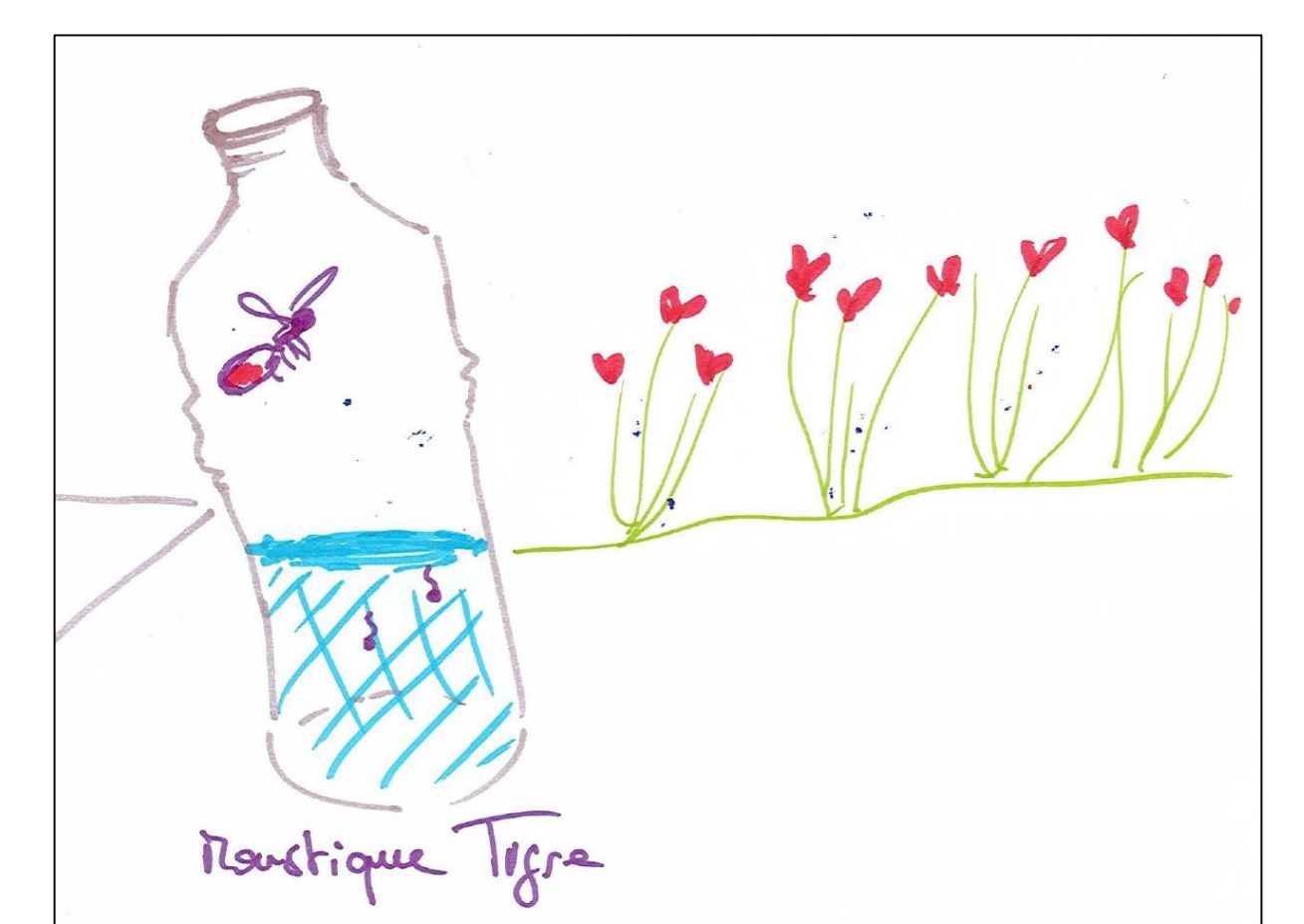


Fig.3: Mosquitoes and water in a macroplastic of the environment

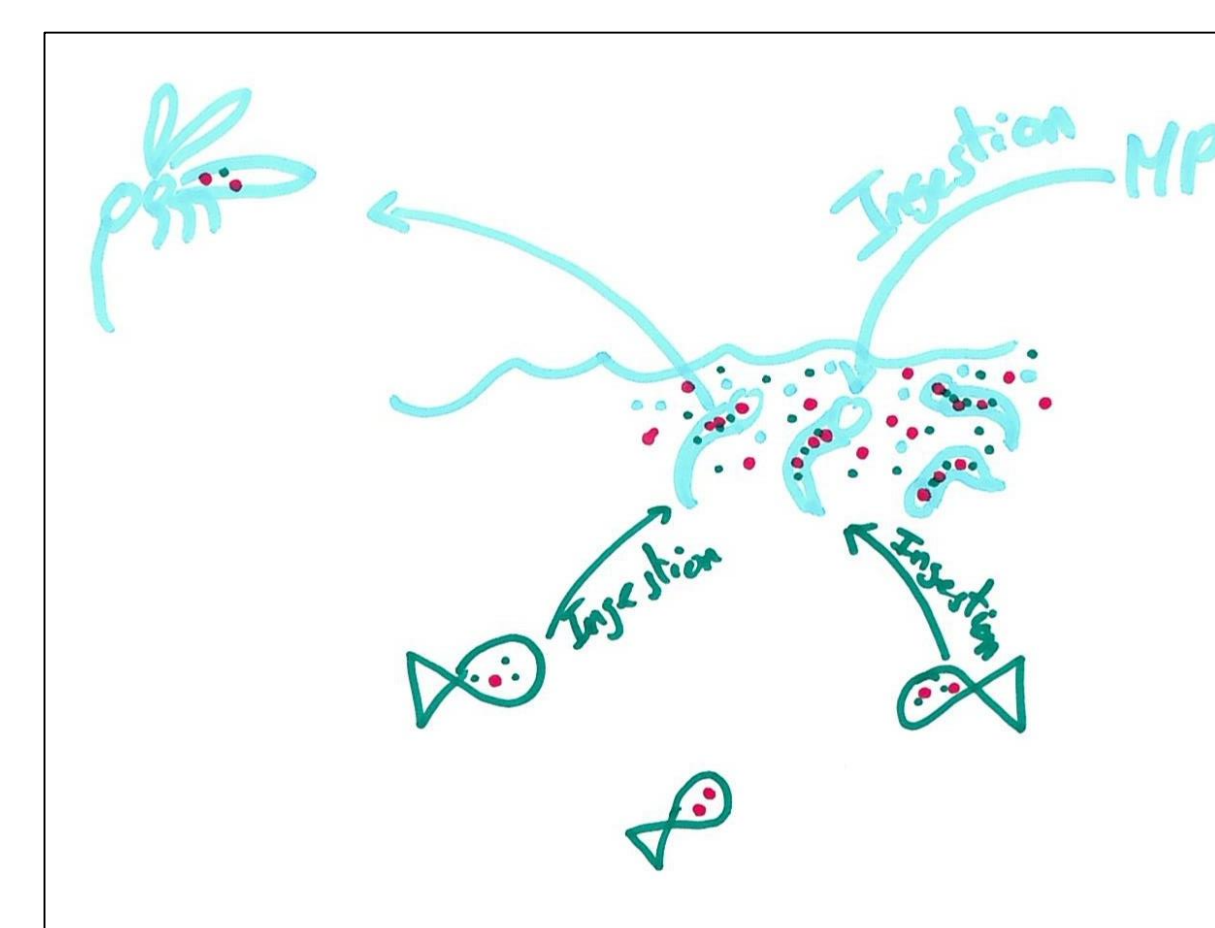


Fig.4: Reference to the ingestion of microplastics by larvae, then fish

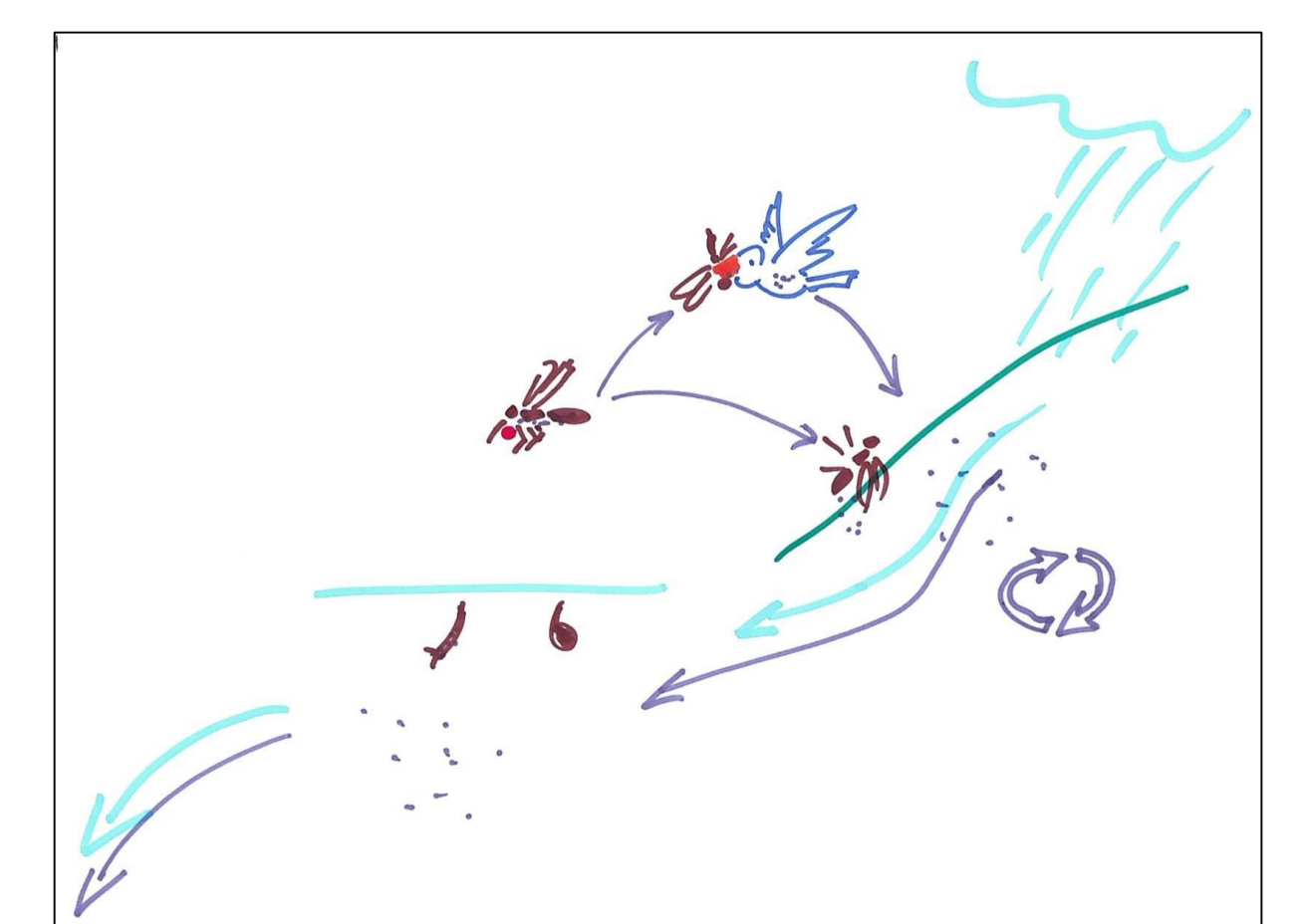


Fig.5: Reference to the transfer of microplastics through bites

Source:

Drawings by interviewees

References:

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