



Great Western Four+ Doctoral Training Partnership (GW4+ DTP)

Particles, chemicals and the marine food web.

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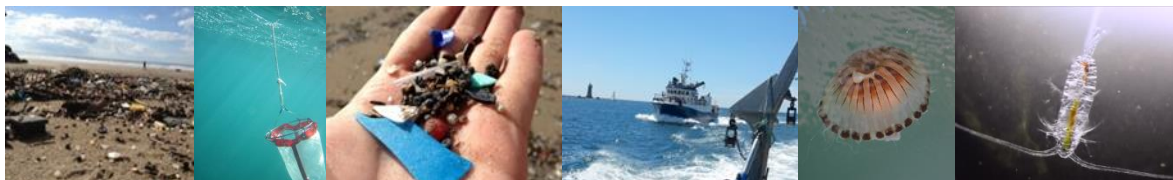
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Background: Over the past 60 years there has been a rapid growth in plastic production, with approximately 300 million tonnes of plastic being manufactured globally each year. Plastic is an inexpensive and durable material with countless applications of benefit to society. However, plastic is increasingly used to manufacture single-use, throwaway products such as food packaging and drinks bottles, or to replace natural materials traditionally used in fishing gear, fabrics, and as exfoliates in personal care products. Every year, millions of tonnes of this plastic debris are discarded. Through improper waste disposal, coastal recreation, fishing and the release of wastewater effluent, a vast amount of plastic enters the marine environment. Here it can take decades or centuries to degrade and as a result this plastic litter is emerging as both a threat to the oceans and a major management challenge for society. Microplastics (small plastic fragments, <5 mm) are highlighted as a contaminant of global environmental concern by the EC's Marine Strategy Framework Directive and in recent years it is the threat that this smaller microscopic plastic litter poses to marine life that has been of growing concern. Recent studies undertaken between PML and the UOE have shown that microplastics can be ingested by zooplankton; small marine animals at the base of the pelagic food web, which can result in adverse health effects. The transfer of these microplastics and associated chemicals from zooplankton at the base of the food web to higher trophic levels remains to be investigated.

Aim: To investigate the transfer of microplastic through the marine food web and the consequence of associated chemicals to animal health.

Methods: This PhD project will investigate the uptake of microplastic particles and their transfer through the marine food web. The effect of associated chemicals on the health of animals will be studied; including organic pollutants which adhere to the outside of plastic particles and thalates which leech from plastics. Trophic transfer of microplastics and bioaccumulation will be studied from the bottom up and top down using a range of traditional and state of the art techniques. With access to two large survey programmes in the western English Channel and control temperature and mesocosm facilities for laboratory based experiments you will address the following questions:

- Do microplastics, zooplankton and marine vertebrates have a spatial overlap in the marine environment?
- Are microplastics, known to be ingested by zooplankton, passed up the food web to higher trophic levels such as jellyfish?
- Using high throughput sequencing techniques and stable isotopes can we determine the diet of turtles, including soft bodied items, to infer if they are likely to ingest microplastics within their prey.
- What is the consequence of ingested microplastics and associated chemicals on the health of zooplankton?



About you: You should have a good first degree in a relevant subject, good communication skills and an enthusiastic interest in environmental issues.