DO LARGER MICROPLASTICS BIOMAGNIFY IN THE DIGESTIVE TRACTS OF COASTAL MARINE ANIMALS?

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Study Description

We conducted a study measuring concentrations of microplastic particles in bivalves, crabs, echinoderms, and fish from across a nearshore marine food web at three sites on southern Vancouver Island in British Columbia, Canada. Despite evidence of trophic transfer of microplastics, our results show that microplastics (100–5,000 μm along their longest dimension) were not biomagnifying, with no correlation between the digestive tract or fish liver microplastic concentrations and trophic position of the various species. Ecological traits did, however, affect microplastic accumulation in digestive tracts, with suspension feeders and smaller-bodied planktivorous fish ingesting more microplastics by body weight.

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Photo 1. Researchers carry out beach seining to collect surfperch and flatfish from the intertidal area of one of the field sites. This was one of many collection methods we employed to collect a range of species, including digging for clams, snorkeling for sea cucumbers, and spearfishing via SCUBA diving. Photo credit: Kieran Cox.

Photo 2. A red rock crab (*Cancer productus*), one of the many species we collected and analyzed for microplastics and trophic position. We used stable isotope analysis to estimate the trophic position of each individual animal. Photo credit: Hailey Davies.

Photo 3. A member of our team dissects a rockfish to remove the digestive tract and liver for microplastic analysis. To isolate microplastics from all animals, we used a potassium hydroxide solution to remove tissues and a sodium iodide solution for sandy samples to float out the plastics from the sand. Photo credit: Garth Covernton.

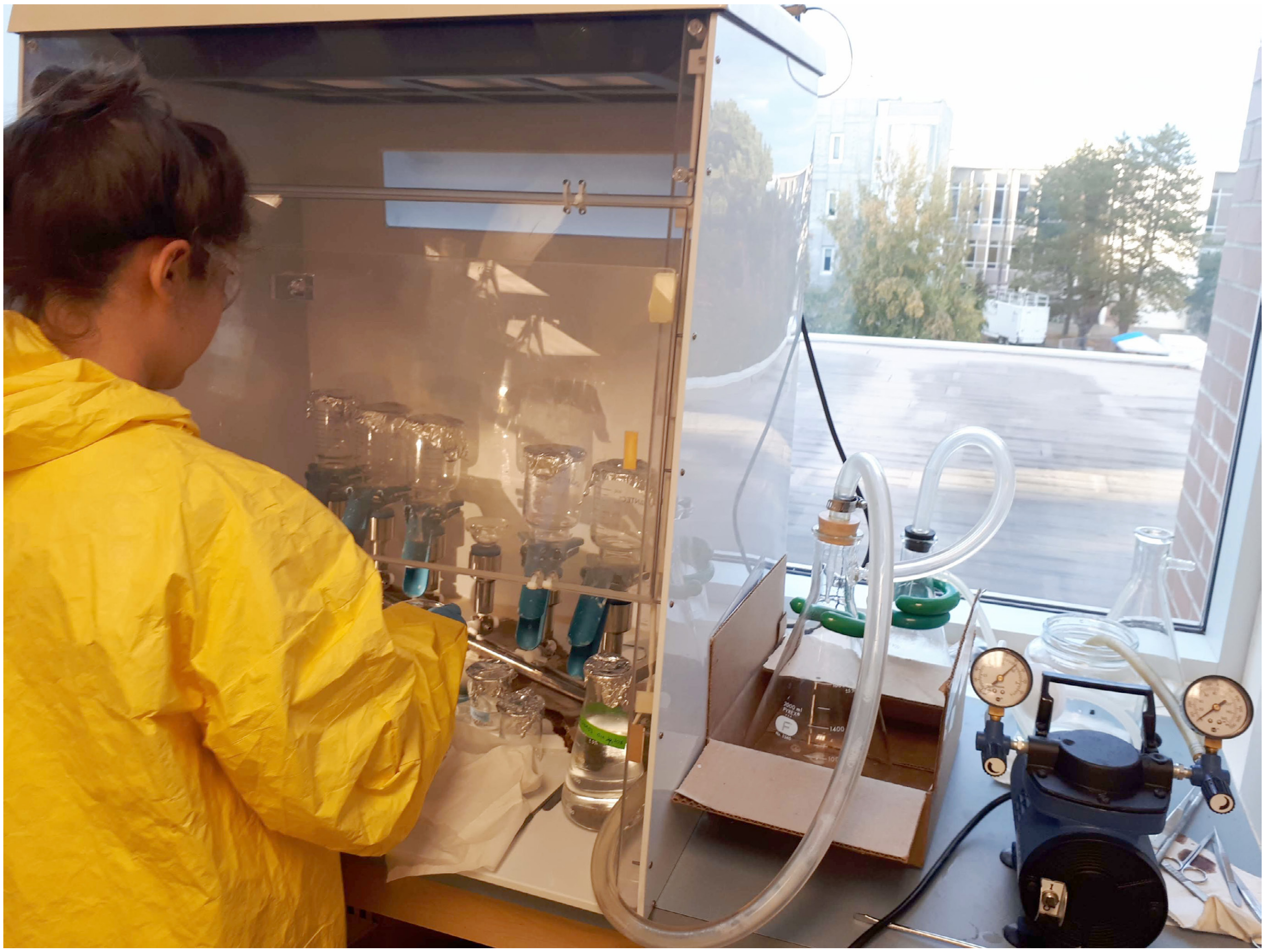

Photo 4. A researcher uses a vacuum pump and filter assembly to filter down tissue samples that have undergone digestion to isolate potential microplastics. We then viewed the filters on a compound microscope and picked off any potential microplastics and placed them onto double-sided tape for spectroscopic analysis. Photo credit: Garth Covernton.

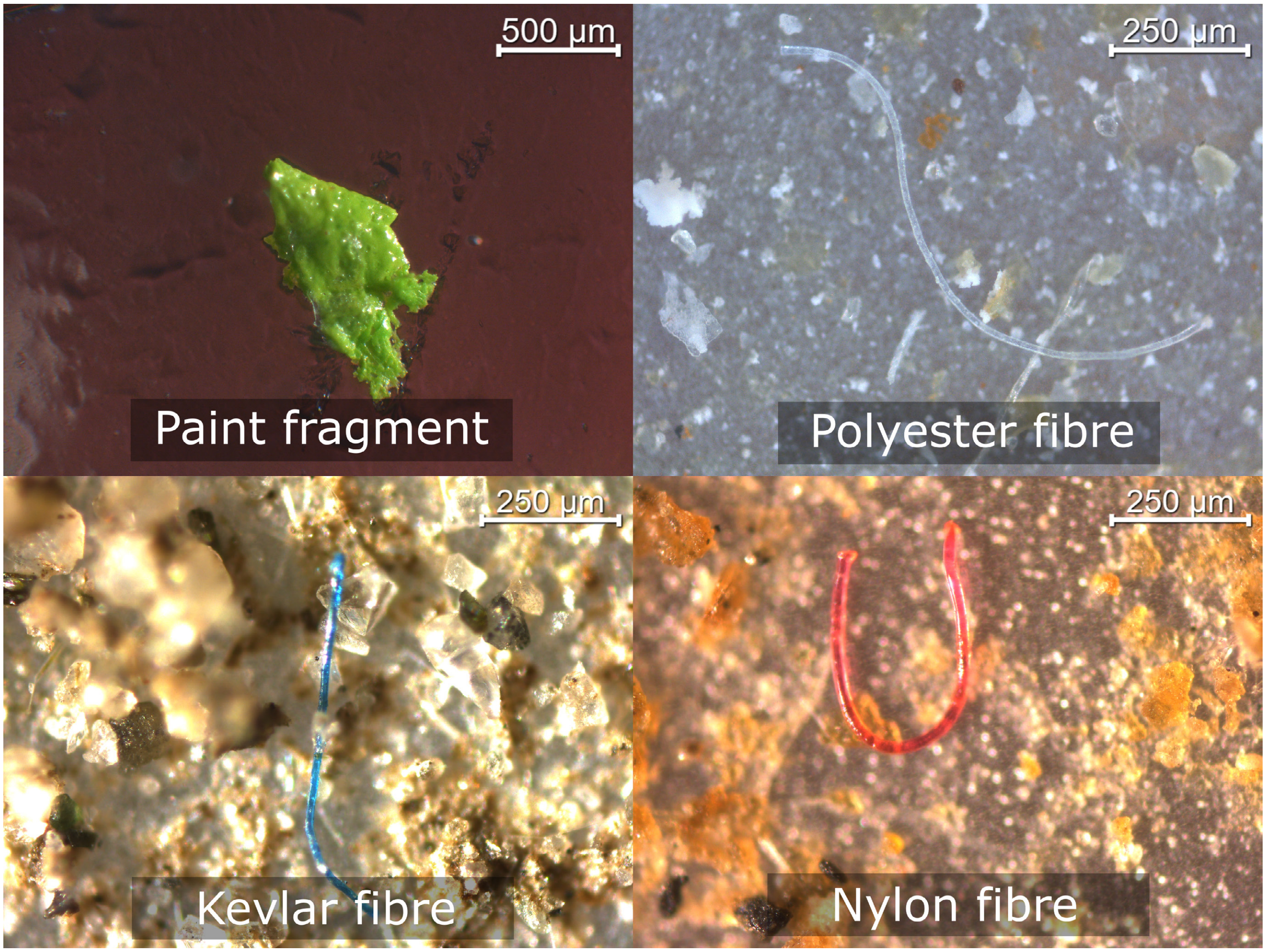

Photo 5. Some of the confirmed microplastic particles found in samples. Digestive tract particle concentrations were low at <1 particle per individual following blank correction. Photo credit: Brittany Buirs (top panels) and Nelson Perks (bottom panels).

These photographs illustrate the article "Large size (>100-μm) microplastics are not biomagnifying in coastal marine food webs of British Columbia, Canada" by Garth A. Covernton, Kieran D. Cox, Wendy L. Fleming, Brittany M. Buirs, Hailey L. Davies, Francis Juanes, Sarah E. Dudas, and John F. Dower published in *Ecological Applications*. https://doi.org/10.1002/eap.2654.