Introduction
The abundance and extent of small (< 5 mm) plastic debris, microplastics (MPs), in aquatic environments is now recognised as among the highest priority issues for environmental policy. MPs can be found in aquatic environments in suspension and/or associated with sediments.

Prominent concerns of microplastics exposure include:
- Ingestion by aquatic organisms
- Accumulation in internal tissues
- Trophic transfer in the food web
- Increased bioavailability of toxic substances (co-contaminants), both by ingestion and available in water by desorption from MPs

1) Are co-contaminants sorbed to MPs bioavailable to organisms through the aqueous phase?

Co-contaminants bioavailability in zebrafish larvae in aqueous phase:
- Co-contaminants were sorbed to MPs and less bioavailable to zebrafish in the aqueous phase
- Contaminants: Phenanthrene and 17α-Ethinylestradiol

2) How long do MPs reside within the digestive tract before egestion? (cont.)

Egestion time: Evaluation of Gut Retention Time (GRT)
- Adult Carcinus maenas crabs fed fish paste & gelatin pellets
- Pellets contained known amount of particles:
  - Control: no particles
  - Large sand (LS): 1000-1230 µm
  - Large plastic (LP): polyethylene (PE) 850-1000 µm
  - Small plastic (SP): PE 47-53 µm

Approach:
- Larval zebrafish, Danio rerio, used as an analytical tool to investigate bioavailability of each co-contaminant in water
- Tested co-contaminants: (Phenanthrene) = 500 ppb and (17α-Ethinylestradiol) = 1 ppb
- Assessed by changes in gene expression (zebrafish cyp1A and vtg)
- (Not a toxicity test)

3) Presence of microplastics (MPs) in marine environments

Microplastics have been reported in some coastal locations, but few areas have been evaluated and the extent of this environmental issue is unknown.

Our goal is to assess abundance and type of MPs in mussels collected from the East and West coast of Scotland
- Collection from sites located in both the East and West coast of Scotland (UK)
- Evaluate and quantify the presence of MPs in mussels within the Mytilidae family
- Horse mussels, Modiolus modiolus (a subtidal filter feeder)
- Blue mussels Mytilus edulis (intertidal filter feeder)
- Develop an extraction and quantification method and apply to collected individuals

Toxicity concerns & future research
- Release and bioavailability of associated co-contaminants to MPs when these particles are ingested by aquatic organisms
- Establish the concentrations that place an environmental risk to organisms

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