Witches Britches and Mermaids Tears: Plastic Pollution Research.

Pennie Lindeque
Many people are familiar with the large items of plastic litter washed up and concentrated on the back of beaches or floating on the sea surface and with the impact this plastic poses to marine animals.

Plastic:
- >300 million tonnes produced/year
- Great benefit to society
- But creates litter

“Witches Britches”
• Large plastic litter is a problem

• Of equal concern is the smaller, microscopic size fraction of plastic.

• Microplastic (≤ 5mm) “Mermaids Tears”

“estimated that at least 5.25 trillion plastic particles are currently floating at sea”

Eriksen et al. (2014) PlosONE
- Microplastic in the marine environment is highly topical.
- Appetite to reduce microplastic pollution evident
- Better understanding of the source, distribution, accumulation, fate and risk.
Marine litter on British beaches: a 10-year assessment using citizen-science data

Sarah Nelms, Charlotte Coombes, Laura Foster, Tamara Galloway, Brendan Godley, Penelope Lindeque, Matthew Witt

Plymouth Marine Laboratory
marine conservation society
EXETER
Results: Most polluted regions - Individual items

Fishing gear

Food & drink packaging

No. items m\(^{-1}\) min\(^{-1}\) person\(^{-1}\)

- Nelms, SE; Coombes, C; Foster, LC; Godley, BJ; Galloway, TSG; Lindeque, PK; Witt, MJ. 2017 Marine anthropogenic litter on British beaches: a 10-year nationwide assessment using citizen science data. STOTEN
Assessment of microplastics in the coastal waters off Plymouth

- 14 sites sampled
- 500, 335 and 100μm nets

Red: 13/07/15
Blue: 06/08/15
Green: 27/08/15
Yellow: 23/09/15
>20,000 particles counted and characterised

- Sampling with a smaller mesh gives a better indication of microplastic budget
- At Mouth of Plym, >15,000 fibres found m\(^{-3}\)
- Of these plastics, the majority were fibres (77 %) or fragments (18 %), with beads contributing 4 %.
Microplastic ingestion by zooplankton: what we know

- Occurs in a range of taxa under laboratory conditions
- Significantly reduces algal feeding in many groups
- Negatively affects health

Ingestion of microplastics by zooplankton in natural environment

- Relative abundance of microplastic ranges from 0.33 – 240 MP per 100 zooplankton

Rame Vertical

Mouth of Plym

Anthropogenic particles m^-3

% Incidence Ingestion

Anthropogenic particles m^-3
Microplastics in seawater, alongside zooplankton

Contaminated prey consumed by predators

Microplastics and zooplankton ingested by fish

Nelms, SE; Galloway, TSG; Godley, BJ; Jarvis, DS; Lindeque, PK. 2018 Investigating microplastic trophic transfer in marine top predators. Environmental Pollution.
Team Microplastic @ PML

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http://www.pml.ac.uk/Research/Research_topics/Facing_the_challenge_of_new_pollutants/Marine_plastics

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