Coming out in the wash

Chloe Juyon reports on Imogen Napper's research focusing on synthetic fibres from clothes entering the environment.

From the deepest point of our oceans to the skies, from the Antarctic to the arctic, from rivers to remote highlands, we are surrounded by microplastic. In 2016, in issue 7 of *The Marine Biologist*, Dr Pennie Lindeque reported on the ingestion of microplastic by zooplankton, demonstrating a route into the food chain. In the past few years, researchers have found traces of microplastics in fish, mussels, shrimp, salt, bottled water, tap water, honey, beer, and even in our gut.

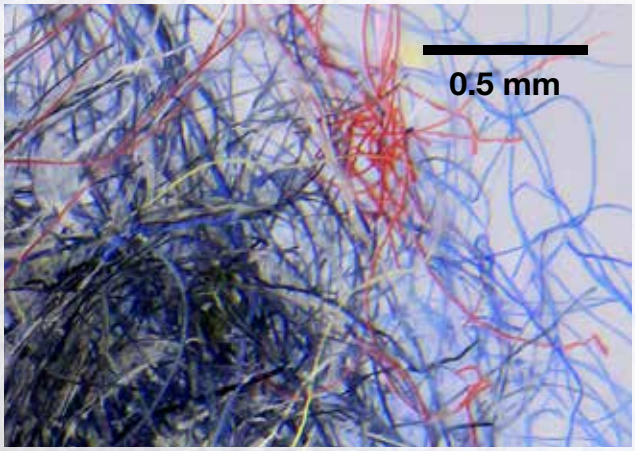
So, what are microplastics? They are plastic particles or fibres smaller than 5 mm found in the environment. They include: particles originating from degradation of larger plastic items; manufactured microscopic particles like those used in various cosmetic products; and synthetic fibres from our clothes that are released in washing machine waste water. Microplastics have become a global challenge due to the threats they pose to biota and public health.

In 2015, Imogen Napper, Research Fellow in the International Marine Litter Research Unit at the University of Plymouth, turned her attention to cosmetic products. She identified that one single shower could send 100,000 microbeads down our drains, representing a possible major source of microfibre contamination in the marine environment. Her findings helped implement a ban on the sale of cosmetic and personal care products containing microplastics in the UK as of June 2018.

The following year, Imogen looked at another possible important source of microplastics in the marine environment: synthetic fibres from our clothes. You might have noticed little balls of 'fluff' on the surface of garments, especially synthetic jumpers. These are referred to as pills. In the washing cycle, pilling occurs due to entanglement, friction or wear of the fabric. Some of these fibres travel through waste water to our sewage treatment plants. After going through various screenings and treatments, the water returns to rivers and the sea. The problem is that some of these fibres are small enough to pass through the screens and end up in the environment. The dark side to this story is that these fibres do not decompose or disintegrate and become vehicles for toxic chemicals and pathogens.

That laboratory equipment looks familiar… Imogen Napper and the washing machines used in her research. Image © Imogen Napper.

Imogen analysed various different fabrics from polyester, polyester and cotton blend, and acrylic garments and put each through various wash cycles at different temperatures, also varying the use of detergent. She found that acrylic-based garments were the worst, releasing on average about 700,000 fibres per wash. She said, 'This is something we do in our everyday life once a day or once every two days. Imagine that every time you wash; then your street, then your town, then a city, then the country: it's a substantial amount of fibres that are coming out of our clothes.'



Microfibres obtained from washing clothes. Image © Imogen Napper.

What can we do? The best way to tackle any pollution issue is to prevent the pollutant entering waterways and oceans at the source. Imogen also found that cotton-polyester blend shed the fewest fibres. Does this mean we should all forget about our acrylic jumpers and only buy cotton blend garments? This would probably be unrealistic, and is why Imogen is currently testing various microfibre 'filters' to find the best way to prevent the release of microfibres from washing machines. She will be able to share her results later this year, helping us to decide which filter to choose. In the meantime, the advice to reduce the amount of fibre being released from your own washing machine is to choose short cycles and low temperature, use liquid bio detergent and always run a full load[1].

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Further reading

https://www.plymouth.ac.uk/research/marine-litter

1 Advice from a 2017 report by the MERMAIDS Consortium, Plastic Soup Foundation, Consiglio Nazionale delle Ricerche (IPCB and ISMAC), Polysistec, Leitat Technological Center, and Ocean Clean Wash.