Microbial answer to plastic pollution?

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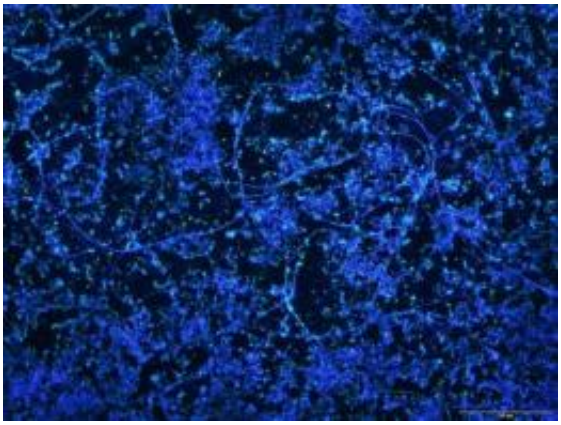

These are microbes from the coastal seabed attached to plastic, as seen through a microscope. Credit: Jesse Harrison

Fragments of plastic in the ocean are not just unsightly but potentially lethal to marine life. Coastal microbes may offer a smart solution to clean up plastic contamination, according to Jesse Harrison presenting his research at the Society for General Microbiology's spring meeting in Edinburgh today.

The researchers from the University of Sheffield and the Centre for Environment, Fisheries and Aquaculture Science have shown that the combination of marine microbes that can grow on plastic waste varies significantly from microbial groups that colonise surfaces in the wider environment. This raises the possibility that the plastic-associated marine microbes have different activities that could contribute to the breakdown

of these plastics or the toxic chemicals associated with them.

Plastic waste is a long-term problem as its breakdown in the environment may require thousands of years. "Plastics form a daily part of our lives and are treated as disposable by consumers. As such plastics comprise the most abundant and rapidly growing component of man-made litter entering the oceans," explained Jesse Harrison.

Over time the size of plastic fragments in the oceans decreases as a result of exposure to natural forces. Tiny fragments of 5 mm or less are called "microplastics" and are particularly dangerous as they can absorb toxic chemicals which are transported to marine animals when ingested.

While microbes are the most numerous organisms in the marine environment, this is the first DNA-based study to investigate how they interact with plastic fragments. The new study investigated the attachment of microbes to fragments of polyethylene - a plastic commonly used for shopping bags. The scientists found that the plastic was rapidly colonised by multiple species of bacteria that congregated together to form a 'biofilm' on its surface. Interestingly, the biofilm was only formed by certain types of marine bacteria.

The group, led by Dr. Mark Osborn at Sheffield, plans to investigate how the microbial interaction with microplastics varies across different habitats within the coastal seabed - research which they believe could have huge environmental benefits. "Microbes play a key role in the sustaining of all marine life and are the most likely of all organisms to break down toxic chemicals, or even the plastics themselves," suggested Mr Harrison. "This kind of research is also helping us unravel the global environmental impacts of plastic pollution," he said.

More information: Jesse Harrison's poster 'The formation and structure of microbial biofilms associated with synthetic microplastics in

coastal sediments' will be displayed on Monday 29 and Tuesday 30 March at the Society for General Microbiology's spring meeting at Edinburgh International Conference Centre.

Provided by Society for General Microbiology