

Are scientists contaminating their own samples with microfibers?

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Collecting water samples from the Hudson River. Credit: Adam Steckley

More than 70% of microplastics found in samples from oceans and

rivers could come from the scientists collecting them.

A new paper by Staffordshire University and Rozalia Project, published in *Marine Pollution Bulletin*, investigates procedural contamination when sampling for microparticles in aquatic environments. The study shows that a significant amount of microplastics and microfibres from scientists' clothing and gear mixes with [environmental pollution](#) in the water samples.

Claire Gwinnett, Professor in Forensic and Environmental Science at Staffordshire University, explained: "In the field this can occur due to the dynamic nature of the environment such as wind or weather, actions required to obtain samples and the close-proximity necessary for scientists to procure and secure samples whether in a medium-sized vessel, small boat or sampling from shore. In a mobile lab, this often occurs due to using small, multi-use spaces and similar requirements for scientists to be in close proximity to the samples while processing."

Data was collected during an expedition along the Hudson River from Rozalia Project's 60' oceanographic sailing research vessel, American Promise. The team tracked contamination by collecting fibers from every possible source of contamination on the vessel including clothing worn by both the science and boat teams, sail bags and tarps, sail and equipment control lines as well as interior textiles. By doing so, they created a catalog to which every fiber and fragment found in environmental samples was first compared. If there was a match, that exact source of procedural contamination was noted. If there was not a match, that microparticle was considered pollution.

The research found that when robust anti-contamination protocols were not used when taking water samples (using a metal bucket for surface samples and a Niskin bottle for mid-water column samples), 71.4% of the microparticles in the samples were contamination; similarly, when

anti-contamination protocols were not used when processing water samples (using a vacuum filtration method), 68.4% of the microparticles in the samples were contamination.

Co-lead author Rachael Z. Miller, Founder of Rozalia Project for a Clean Ocean, said: "This is a study that was designed to strengthen the scientific process and has revealed the extent to which our clothing sheds, not just in the washing machine or dryer, but as we wear it and conduct ourselves in our [everyday lives](#). It appears that we are all Pigpen, but instead of walking around in a cloud of dirt, we may be emitting clouds of microfibrils.



Collecting samples from the Hudson River on the American Promise. Credit:

Rachael Z. Miller

"Some take-aways for everyday people from this study are to: take care of the clothes we have—that can be done by adapting laundry routines to reduce fiber-breakage such as washing in cold water and air drying when possible; being mindful of the clothing we choose—more and more information is coming out about how much various types of fabrics shed, and supporting brands and organizations who are aware of and addressing the problem by working to better understand our textiles and who are innovating to make them both more resilient and out of materials that exert less pressure on our natural world, while still maintaining their ability to protect us from the elements."

The study also sets forth methods inspired by [forensic science](#) that could make a 37% reduction in the amount of procedural contamination mistakenly added to environmental samples during the collection phase of a study. This reduction can save research teams a significant amount of time by reducing the number of microparticles that must be analyzed.

Solutions for future studies include outfitting the whole team in the same low-shed, unusually colored garments ideally also with unusual fiber morphology. This would allow for rapid identification as contamination. It is important for the entire boat crew to be included in these quality control considerations since fibers from the captain and first mate were also found in samples during this study.

The researchers also describe a workflow using a polarizing light microscope (PLM) that can save research teams both time and money when microparticle, in particular microfibre, identifications must be made. When paired with Easylift tape, an innovation used for sampling and fixing microparticles after vacuum filtration, this study found that a

PLM could produce a high-confidence/correct material identification in 93.3% of the microfibrils found in the [water samples](#). PLMs can be obtained for under \$4,000 and take a fraction of the time to use compared to the other methods.

Professor Gwinnett added: "Thinking like a forensic scientist during sampling for microplastics has its benefits as this study has shown. Forensic scientists are constantly thinking about how they might contaminate samples and how to prevent that. Forensic scientists also acknowledge that it is impossible to have zero contamination and instead focus on creating protocols to minimize and monitor.

"By using forensic analysis techniques, which aim to fully profile a particulate, including its morphological, optical and chemical characteristics then these 'layers' of information allow much more confident conclusions to be made as to whether it is from the environment or from procedural contamination."

More information: C. Gwinnett et al, Are we contaminating our samples? A preliminary study to investigate procedural contamination during field sampling and processing for microplastic and anthropogenic microparticles, *Marine Pollution Bulletin* (2021). [DOI: 10.1016/j.marpolbul.2021.113095](#)

Provided by Staffordshire University

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