Microplastics—an environmental cause for concern

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Plastics became widespread after the second World War, and as a material, plastic is still relatively young. Microscopic plastic particles, or microplastics, have caught the eye of researchers only quite recently. Microplastics come with plenty of questions, but for the time being, only few answers are available.

"Microplastics are a Pandora's Box of a kind, or at least an infinite source of research questions. However, research evidence relating to microplastics and their effects remains scarce," says Samuel Hartikainen of the University of Eastern Finland. His research focuses on the chemical properties of microplastics.

Whirlpools of plastics and microplastics in oceans have received plenty of attention in the media. However, microplastic concentrations in lakes and other closed bodies of water may be higher than in oceans, where the water flows freely.

"Microplastics are present in practically all bodies of water, although the remotest ones haven't been scientifically studies, of course. We can nevertheless assume that airborne microplastics have found their way also in these waters," says research manager Arto Koistinen, who also studies microplastics chemistry.

Microscopic particles of plastic have also been found in the intestines of fish and other seafood. Microplastics aren't poisonous as such, but they are known to absorb hormone disruptors and heavy metals. So, can

microplastics find their way on our plates, and can hazardous materials absorbed by microplastics make our food poisonous?

"There is no clear evidence of possible health risks of microplastics in the food chain or drinking water. This is due to the fact that the methods of environmental health risk assessment have been introduced just recently to determine possible health risks caused by microplastics. It is possible that microplastics eaten by fish and other seafood can release harmful substances that eventually end up in food. This interface plays a key role, and this is why chemical analysis of plastics is important. It is important to study the chemical content of microplastic particles to understand their chemical properties and behaviour in the digestion track of fish and other animals. Moreover, it is important to study all possible sources of microplastics, collect and analyse samples from the environment, monitor the possible pathways of microplastics and harmonise globally the standard analytical methods relating to microplastic studies," Hartikainen says.

"The interface between the chemistry of plastics and the human body is also interesting from the viewpoint of medical plastics. For example, plastics used in joint replacements can wear and tear over time, resulting in microplastics within the body," Koistinen says.

Plastics in water are known to carry microbes and non-native species. According to Hartikainen and Koistinen, there is reason to believe that also microplastics can carry viruses and bacteria.

"Although we don't understand all the mechanisms relating to plastics just yet and the research evidence is not comprehensive, we nevertheless know that plastics have certain properties that affect the environment and human health. This is why we should follow the precautionary principle and combat possible adverse effects already now," Koistinen says.

"It is impossible to abolish all sources of plastic waste, but we should first focus on the major ones, including industrial sources. On the other hand, littering is also something that can be impacted on through educational campaigns and solutions relating to the infrastructure. For example, it actually helps to have litter cans on beaches together with effective waste management," Hartikainen says.

Provided by University of Eastern Finland