

An overview of methods for identification and quantification of microplastics in the marine environment

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COMMENTARY

Since the development of synthetic polymers in the middle of the twentieth century, the global output of plastics has expanded dramatically. Plastics can be an environmental danger when they are abandoned in the maritime environment. Plastic waste comes in all shapes and sizes, from micrometres to metres, and enters the marine ecosystem. Microplastic particles are made up of either microscopic-sized manufactured plastics, such as scrubbers and industrial pellets, which serve as precursors for manufactured plastic products (primary sources), or fragments or fibres of plastics derived from the breakdown of larger plastic products (secondary sources) (secondary sources). Plastic degradation is exceedingly slow; therefore microplastics could linger in the marine environment for a very long time. For a variety of reasons, the presence and accumulation of microplastics in the ocean is of great concern, particularly because they are swallowed by marine biota. Persistent bio accumulative and hazardous substances, such as persistent organic pollutants and metals, can be absorbed by microplastics from seawater. The absorbed contaminants may be passed to the corresponding organisms once consumed. While microplastics have been found in a wide range of marine creatures, the extent to which ingestion could provide a toxicological risk is unknown. Most studies have focused on estimating microplastic abundance in the marine environment in order to acquire a better understanding of the implications of microplastics. The fact that a variety of methodologies have been employed to identify and quantify microplastics is one of the key challenges with large-scale spatial and temporal comparisons. Microplastics are also made up of a diverse collection

of fragments that differ in size, shape, colour, particular density, chemical makeup, and other features. It is also critical to develop particular scientific criteria for estimating the abundances, distribution, and composition of microplastics in order to make relevant comparisons and monitoring. The term “microplastics” was used in 2004 to characterize very minute plastic pieces (less than 50 micrometres) found in the water column and sediments. However, there is no commonly accepted definition of the size range for microplastics at this time. In the early 1970s, little plastic particles were initially discovered in the marine environment. The ingestion of microplastics by marine creatures, as well as the physiological and ecological consequences, has recently received attention. Microplastics sampling in the primary marine ecosystems (sea surface, water column, sediment) necessitates a variety of approaches: selected, bulk, or volume-reduced samples. In the field, selective sampling is taking things that are visible to the naked eye from the environment, usually on the surface of sediments. When microplastics are combined with other debris or have no distinguishing shapes (i.e., uneven, rough, angular), there is a high chance of overlooking them 50, therefore special caution should be exercised when sampling them in the field. Bulk samples are those that are taken in their entirety without being reduced throughout the collection procedure. The mesh size and opening area of the sampling nets are the most important features to consider. For bulk and volume-reduced samples, laboratory preparation and subsequent sorting of microplastics is required. To avoid misidentification and underestimate of microplastics, it is vital to standardize plastic particle selection by adhering to a set of criteria

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