

Assessment of Synthetic Microfibers from Clothing in the Aquatic Environment and Implications for Zooplankton

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Microplastics encompass all plastics that are less than 5mm. To date, microplastic origins are incompletely understood, however they are categorized as primary and secondary, according to the nature of their production. Primary microplastics are released through domestic and industrial waste while secondary microplastics are produced over years of degradation. They are in the form of microbeads, micro fragments, and microfibers which are now found in all aquatic and terrestrial environments. Microfibers are plastics that are shed from clothing made of synthetic textiles, during the laundering process. Approximately two thirds of all textile items are now synthetic, with polyester being the most common synthetic fiber. It is estimated that 0.33 million tons of textile microfibers enter the oceans annually, via laundry. They enter the aquatic environment and are consumed by lower trophic level marine organisms. Thirty three samples of various types of fabric were laundered, with and without detergent, in order to determine which fabric type sheds the most fibers. Fabric types included hemp, polyethylene, nylon, Tencel®, viscose, recycled polyester, polyester, and polyamide. Our results indicate that polyamide sheds the largest amount of fibers. Surface water samples were analyzed from the Connecticut River and our test results showed that 29% of the microplastics were microfibers while in the Long Island Sound estuary, microfibers constituted 7% of the microplastics collected. Calanus copepods collected from Long Island Sound also contained microfibers which constituted 11% of the total microplastics found in their bodies. This indicates the presence of microplastic at the low trophic levels which can possibly lead to bioaccumulation.