

Burrowing Invertebrates Induce Fragmentation of Mariculture Styrofoam Floats and Formation of Microplastics

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Abstract : Secondary microplastics originate from the fragmentation of large plastics, and weathering is supposed to be the main cause of fragmentation. In this study, we investigated burrows and burrowing invertebrates on Styrofoam floats from the mariculture areas of China's coastal waters. Various burrows were found on the submerged surface of Styrofoam floats and could be divided into 'I', 'S', 'J', and 'Y' types based on the burrow entrance number and passage curvature. Different invertebrate species, including 5 isopods, 8 clamworms, and 12 crabs, were found inside the burrows. Micro-foams were found in the bodies of these burrowers, with an average abundance of 4.2 ± 0.3 (isopod), 6.9 ± 2.0 (clamworm), and 3.0 ± 0.5 (crab) micro-foams per individual. In the laboratory, we observed the boring process of crabs in abandoned floats. Field and laboratory evidence suggested that these invertebrates bored various burrows. The total volume of crab burrows on a 3-year-used float was estimated to be $2.6 \times 10^3 \text{ cm}^3$, producing 4.1×10^8 microplastics. This study highlights the critical role of bioerosion in destroying man-made substrates and prompting microplastic pollution.

Keywords : burrowing invertebrate, mariculture area, styrofoam float, fragmentation, microplastics

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