

Ecotoxicity of discharged plastic materials on marine organisms

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Synthetic plastics and micro-plastics (MPs) represent one of the major environmental concern. In recent years, biodegradable polymers (BPs) have been proposed in commercial products as a solution to marine plastic pollution, even if their wide use is causing new pollution alarm. This work aimed to study the potential toxic effects of selected MPs deriving from the degradation processes of various BPs (polybutylene succinate, PBS; polybutylene succinate-butylene co-adipate, PBSA; polycaprolactone, PCL; poly-3-hydroxybutyrate, PHB; polylactic acid, PLA) and conventional plastics (polypropylene, PP; polystyrene, PS) characterized by different sizes, as virgin polymers and deriving from commercial products, evaluating also the potential toxicity linked to chemical additives added during the manufacturing processes. Their effects were detected on the physiology of marine invertebrates, characterized by distinct feeding strategies: the grazing sea urchin *Paracentrotus lividus* Lmk, a well-established marine model organism, and the grazing isopod *Idotea balthica basteri* Pallas and the selective grazing shrimp *Hippolyte inermis* Leach, used as an ecotoxicological model for the first time. Both morphological effects at various endpoints, according to the grazers, and molecular effects were assessed to monitor the variations of gene expression induced by MPs, used as a challenging tool for biomonitoring of the environment. Our results clearly showed that i. the planktonic larvae of *P. lividus* and *H. inermis* were more sensitive to MPs respect to the adult isopod; ii. the size of the MPs could be responsible of these effects probably linked to mechanical stress. In conclusion, our findings shed light on the cellular and molecular mechanisms, underlying the biological responses to these emerging contaminants in the aquatic environment.

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