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## Polycyclic aromatic hydrocarbon sorption and bacterial community composition of biodegradable and conventional plastics incubated in coastal sediments.

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**Abstract:** Resistant to degradation, plastic litter poses a long-term threat to marine ecosystems. Biodegradable materials have been developed to replace conventional plastics, but little is known of their impacts and degradation in marine environments. A 14-week laboratory experiment was conducted to investigate the sorption of polycyclic aromatic hydrocarbons (PAHs) to conventional (polystyrene PS and polyamide PA) and bio-based, biodegradable plastic films (cellulose acetate CA and poly-L-lactic acid PLLA), and to examine the composition of bacterial communities colonizing these materials. Mesoplastics (1?cm<sup>2</sup>) of these materials were incubated in sediment and seawater collected from two sites in the Gulf of Finland, on the coast of the highly urbanized area of Helsinki, Finland. PS sorbed more PAHs than did the other plastic types at both sites, and the concentration of PAHs was consistently and considerably smaller in plastics than in the sediment. In general, the plastic bacterial biofilms resembled those in the surrounding media (water and/or sediment). However, in the sediment incubations, the community composition on CA diverged from that of the other three plastic types and was enriched with Bacteroidia and potentially cellulolytic Spirochaetia at both sites. The results indicate that certain biodegradable plastics, such as CA, may harbour potential bioplastic-degrading communities and that PAH sorption capacity varies between polymer types. Since biodegradable plastics are presented as replacements for conventional plastics in applications with risk of ending up in the marine environment, the results highlight the need to carefully examine the environmental behaviour of each biodegradable plastic type before they are extensively introduced to the market.

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