

ABSTRACT

The ocean is faced with increasing plastic pollution, including omnipresent plastic microparticles and microfibrils. Because sponges, benthic filter-feeding animals, incorporate foreign particles, the question whether sponges are potential bioindicators for microplastic pollution arises. To answer this question, the diversity of foreign particles incorporated in Indonesia coral reef sponges sampled around Bangka Island (North Sulawesi) was explored. Twenty-seven demosponges were identified to the lowest taxonomic level possible by DNA barcoding, histologically investigated, and which 15 specimens analyzed for the nature of their foreign particle content using Raman spectroscopy. Particles were observed in the ectosome and spongin fibres, where they presumably provide strength and support growth to sponges, especially to those from the Subclass Keratosa. The mesohyl appears as a transit zone where particles are transported from the ectosome to sites of skeletogenesis as well as for egestion. A total of 24 different particle types were identified, of which degraded man-made products, such as titanium oxides and automotive blue paints, were incorporated by six specimens. The uptake of particles, however, appears independent of the material, which suggests that the fluctuation in material ratios is due to the spatial variation of surrounding sediments. It is not possible to confidently conclude that sponges have a potential to biomonitor microplastics, because no microplastic could be detected with the method used. Nonetheless, this study narrows the knowledge gap on particle incorporation processes and provides the only document to date describing in detail the variety of particles incorporated by sponges.