11h45-12h30, Project results EPHEMARE: (i) General Introduction (Ricardo Beiras); (ii) Uptake and accumulation (Ronny Blust); (iii) Trophic Transfer (Thomas Braunbeck); (iv) Toxicity assessment (J Bellas) and (v) Field validation (Stefania Gorbi).

ECOTOXICOLOGICAL EFFECTS OF MICROPLASTICS IN MARINE ECOSYSTEMS (EPHEMARE); SYNTHESIS OF RESULTS

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Microplastics (MP) have been found in every marine compartment where they have been searched, from surface water to the bottom sediments, and in most marine species. Microplastics, initially defined as plastics below 5 mm, have been traditionally sorted out by eye or under binocular microscope. Manta trawls, neuston and plankton nets do not catch particles smaller than ca. 300 µm, while those taken up by marine organisms are typically smaller than 100 µm. Different organisms can be used as bioindicator species for MP depending on their habitat or diet preference, mussels being particularly suitable for fibers. The most frequent typologies of microplastics extracted in marine biota were PE (61%) followed by PP (19%).

MP have been shown to be easily ingested by zooplankton and transferred across these food webs, but they are not acutely toxic (LOEC>30 mg/L) in the standard 24-48 h acute tests. New, promising endpoints related to behavior, immune response, reproduction and development seem more sensitive to test microplastic toxicity. Jellyfish larva behavior is affected at environmentally relevant levels of MPs. Fish exposed to MPs are susceptible to stress increasing mortality rates, inducing apoptosis, immunosuppression and histopathological damage. Long-term dietary exposure lasting from hatching until adulthood reduced female growth, decreased reproductive output, and increased abnormal offspring of embryos and larvae. Multi-stress experimental set-ups seem most adequate to test the potential effects of MPs. MPs are not necessarily the prime cause of toxicity but aquatic organisms may become more sensitive to additional insults in their presence. The novel ecotoxicological tools developed within the framework of EPHEMARE may contribute to set more protective environmental quality standards for microplastics than current standard tests that fail to detect certain effects and interactions.

MP from consumer products obtained after compounding with chemical additives are more toxic than polymer resins for both PE and PVC. Concerning chronic effects some plastic additives have shown reproductive toxicity due to their endocrine disrupting properties, and have been restricted in food-contact, children products or medical applications. However, even in those cases the information of the composition of plastic products is not disclosed to the consumers. In fact, no information at all on additives is included in labeling of consumer products which makes very difficult to conduct a proper hazard or risk assessment.