PhD Programme in
"Models and Methods for Material and Environmental Sciences" (XXXVIII cycle)

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Abstract of the Thesis: **Assess the impact of marine litter on Mediterranean cnidarians combining laboratory and field surveys**

Plastic pollution is an emerging threat to global marine diversity. The Mediterranean Sea has been recognized as a pitfall for the accumulation of plastic litter, which through weathering and fragmentation releases large quantities of small particles, defined as microplastics (< 5 mm)[1]. Due to their size, microplastics can be ingested from a wide range of marine organisms, including zooplankton. Impacts can include physical damages and potential toxicity due to plastic composition and persistent, bioaccumulative and toxic substances leached from the plastic or adsorbed onto its surface[2].

Among gelatinous zooplankton, the scyphozoan *Pelagia noctiluca* (Forsskål, 1775) has recently been reported as potential target for marine litter, being able to internalize anthropogenic fragments, from macro- to microplastics[3]. The mauve stinger *P. noctiluca* is one of the most abundant and widespread jellyfish in the Mediterranean Sea. It is considered an opportunistic predator, feeding on zooplankton of a broad size and taxonomic range, and a key food source for its predators[4]. Hence, the use of this jellyfish as bioindicator for plastic pollution may disclose new pathways for microplastics along the marine food webs. However, how this jellyfish could be affected by microplastics still remain unexplored.

The key objective of my PhD is, therefore, to investigate the availability, occurrence and impacts of microplastics in *P. noctiluca*, combining laboratory tests and extensive field surveys.

During the first months of my PhD research, sampling campaigns in Mediterranean sites characterized by high/low microplastic accumulation will be conducted to monitor microplastic intake in *P. noctiluca* populations exposed in their natural environment. The physical and chemical features of the microplastics retrieved will be determined thanks to in-depth characterization analyses.

Another research topic of my PhD will focus on the biological interactions between *P. noctiluca* and microplastics, to uncover the drivers behind plastic consumption in jellyfish.

Moreover, laboratory experiments will be performed by exposing *P. noctiluca* specimens to reference microplastics under controlled conditions to investigate the short- and long-term effects of microplastics on this jellyfish species. A wide-ranging of ecotoxicological endpoints will be evaluated, exposing organisms to realistic concentrations of microplastics and reproducing environmentally relevant exposure scenario.

In addition, as marine zooplankton plays an important role in supporting carbon transfer from surface waters to the deep sea, I will collect data to estimate whether microplastics internalized by gelatinous zooplankton may impact the efficiency of the biological carbon pump.

REFERENCES

[1]Andrady (2017). The plastic in microplastics: A review. *Mar. Pollut. Bull.*, 119(1), 12-22.

[2]Botterell et al. (2019). Bioavailability and effects of microplastics on marine zooplankton: A review. *Environ. Pollut.*, 245, 98-110.

[3]Macali et al. (2018). Episodic records of jellyfish ingestion of plastic items reveal a novel pathway for trophic transference of marine litter. *Sci. Rep.*, 8(1), 1-5.

[4]Canepa et al. (2014). *Pelagia noctiluca* in the Mediterranean Sea. In: *Jellyfish blooms*. Pitt, K., Lucas, C. (eds). Springer, Dordrecht. pp. 237-266.