MONITORING PLASTIC POLYMERS INGESTED BY SEA TURTLES IN SOUTH-WEST SPAIN

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INTRODUCTION

Marine litter is defined as "any persistent solid of non-natural (manufactured) origin that has been discarded, dumped, deposited or abandoned in marine and/or coastal environments" (UNEP, 2009)*. Around 80% of marine litter is composed of plastic, mainly due to its high resistance to degradation, causing it to remain in the environment for long periods of time. In fact, large accumulations of plastic generate visible impacts on marine organisms, such as ingestion or entanglement, which in some cases can even cause the immediate death of the individual by suffocation.

For this study, the team was formed with the collaboration between marine scientists from the University of Cadiz specialized on marine litter and associated veterinarians from the Seashore Environment and Fauna. The aim was the identification of the most frequent polymers ingested by two species of sea turtles considered vulnerable on the IUCN red list: *Caretta caretta* and *Dermochelys coriacea*, which are predominant in South-West Spain (Fig. 1).

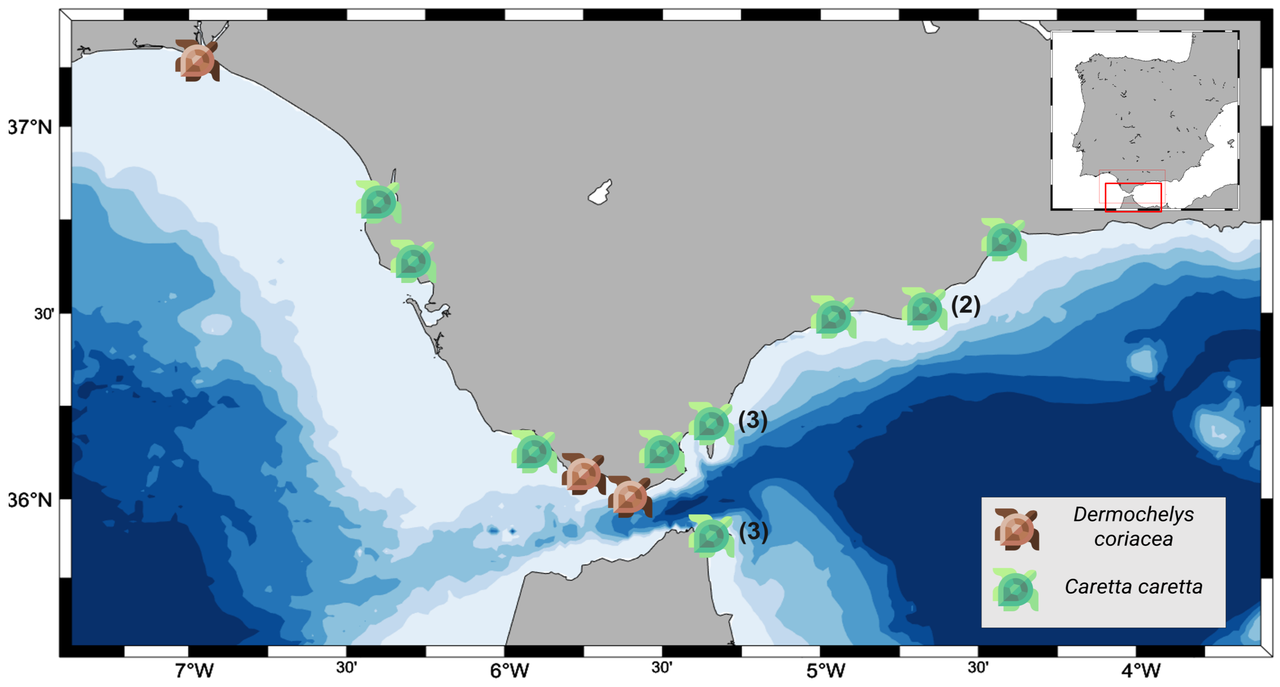


Figure 1. Study area (SW Spain) and location where *Caretta caretta* (green, 14 individuals) and *Dermochelys coriacea* (brown, 3 individuals) where found.

METHODOLOGY

1. NECROPSIES AND DIGESTIVE TRACT SEPARATION

The extraction of litter and microplastics (MPs, smaller than 5 mm) started with the necropsies performed to each specimens. During this process, the entire digestive tract was separated and preserved in a freezer for subsequent laboratory analysis.

2. SEPARATION OF VISUAL PLASTIC

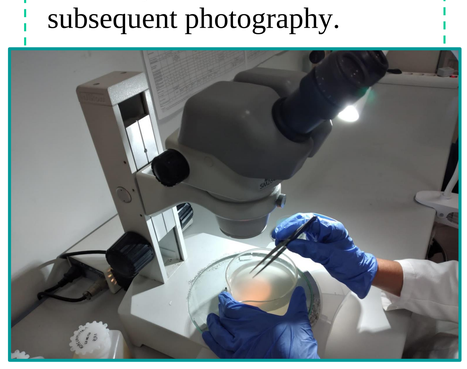
The stomachs were examined for diet analysis and separation of visible plastic. The digestive tract and remaining content of the stomach was sieved through a mesh size of 200 µm, then labelled into jar using fresh water and stored in the freezer (-20°C) until the digestion.

3. DIGESTION

First, the water was removed in order to weigh the content of the sample. Then, the sample was placed in an Erlenmeyer flask with a 10% basic KOH solution (adding at least 3 times the weight of the sample). Finally, the flask was left in a wet bath for 24 hours at 40°C.

4. SEPARATION OF MPs USING A STEREO MICROSCOPE

The digested content was cleaned using filtered seawater and then transferred to a crystallizing dish that allows to viewed the sample using a stereo microscope. Due to density difference, MPs were separated and then placed manually into a Petri dish for subsequent photography.



5. IMAGE PROCESSING AND FTIR ANALYSIS

Each individual item was weighted, counted and measured (area, ferret diameter, RGB color) using ImageJ Fiji software. Lastly, the Fourier-transform infrared (FTIR) spectroscopy was used to provide specific information about the polymer.

RESULTS

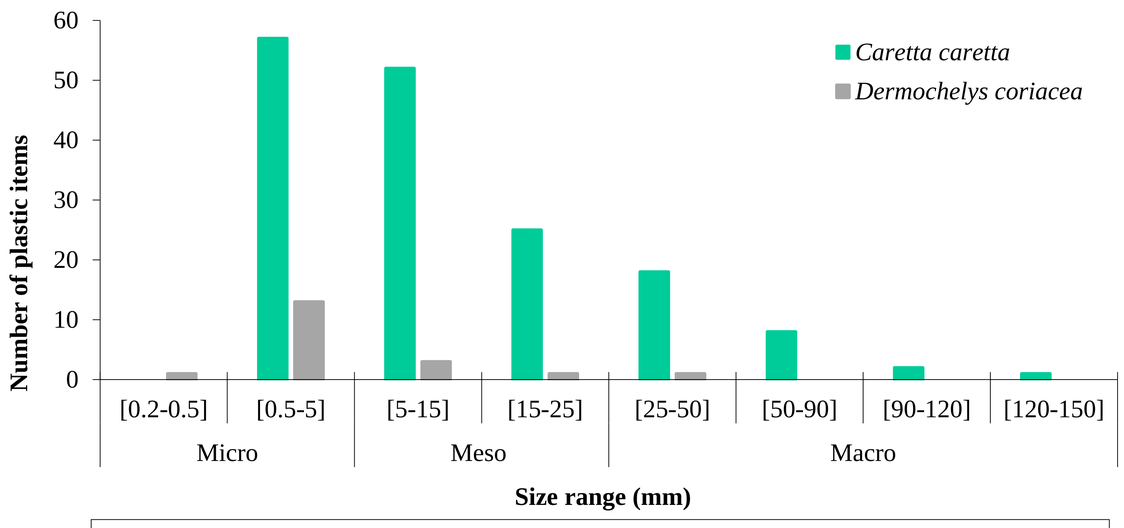


Figure 2. Size spectrum of plactic items found in *Caretta caretta* and *Dermochelys coriacea*.

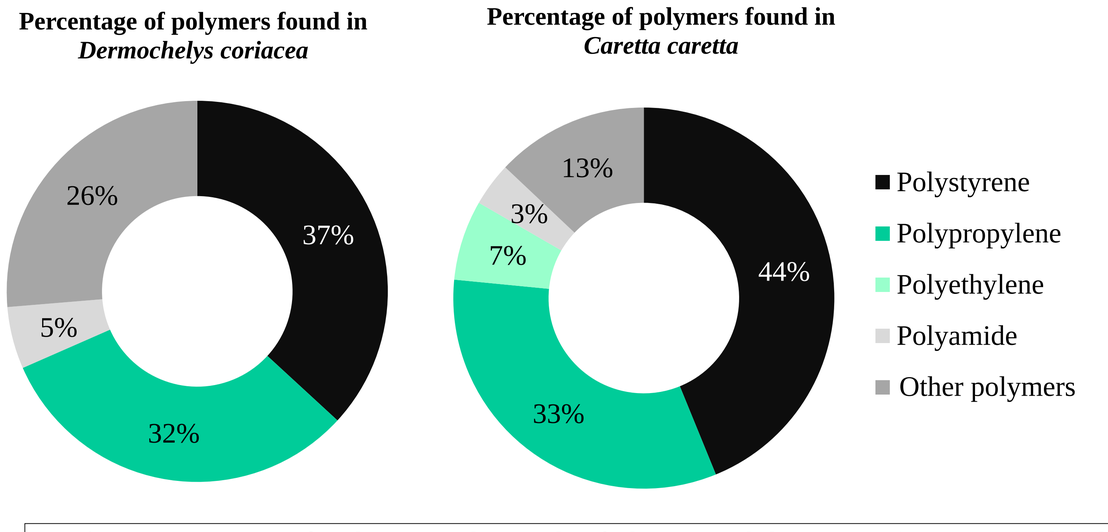


Figure 3. Percentages of predominant polymers identified in *Dermochelys coriacea (*19 items in total) and *Caretta caretta* (163 items in total).

CONCLUSION

- Plastic debris has been found in all analyzed turtles, with an average of 11 plastic items per individual.
- The size range of the plastic items varied from 0.2 to 127 mm with a particular high frequency of small fragments ranging between 0.5 to 15 mm. Some identifiable items included a gum wrapper, a lid and a straw.
- Polystyrene and polypropylene were the most common polymers found.
- The relationship between plastics found inside these organisms as a possible cause of death remains uncertain.
- Given the high presence of small-size plastic in sea turtles, it is suggested to standardize a methodology for the identification of plastic with a lower size-limit of at least 0.2 mm.

* UNEP, 2009. Marine Littter: A Global Challenge. In: United Nation Enronment Programme, Nairobi, Kenya, p. 232.