

Comparison of microplastic content in two marine vertebrates in the Mediterranean Sea: loggerhead turtles (*Caretta caretta*) and striped dolphins (*Stenella coeruleoalba*).

Novillo O.*, Raga J.A., Tomás J.
*olga.novillo@uv.es

Cavanilles Institute of Biodiversity and Evolutionary Biology, University of Valencia. P.O. Box 22085, E-46071 Valencia, SPAIN.

INTRODUCTION

Microplastics are becoming well documented in different environmental compartments. However, little is known about their presence in **wild and non-commercial protected species** yet. In this **on-going study**, we compare microplastic contents in the digestive tracts of **loggerhead turtles (*Caretta caretta*)** and **striped dolphins (*Stenella coeruleoalba*)** stranded in Valencia region (East Spain). In total, we analysed 12 loggerheads stranded in 2017-2018, and 46 striped dolphins stranded between 1989 and 2017. Our **aims** are:

- 1. **Quantify** microplastic abundance in these two protected species.
- 2. **Compare** microplastics abundance and composition, taking into account ecology and distribution.



Fig 1. a) *Stenella coeruleoalba*, b) *Caretta caretta*. Image credits: NOAA.

MATERIAL AND METHODS

- 1. **Necropsies** of fresh carcasses of *Caretta caretta* and *Stenella coeruleoalba* (N = 12 and N = 46, respectively).
- 2. **Size separation** of digestive contents with 200µm, 500 µm and 5 mm sieves (fig. 1).
- 3. **Digestion** of collected contents in KOH 10% during 3 weeks.
- 4. **Vacuum filtration** in a laminar flow cabinet (positive pressure), so as to prevent contamination of samples by microplastics in the workplace.
- 5. **Observation and quantification** under stereomicroscope.

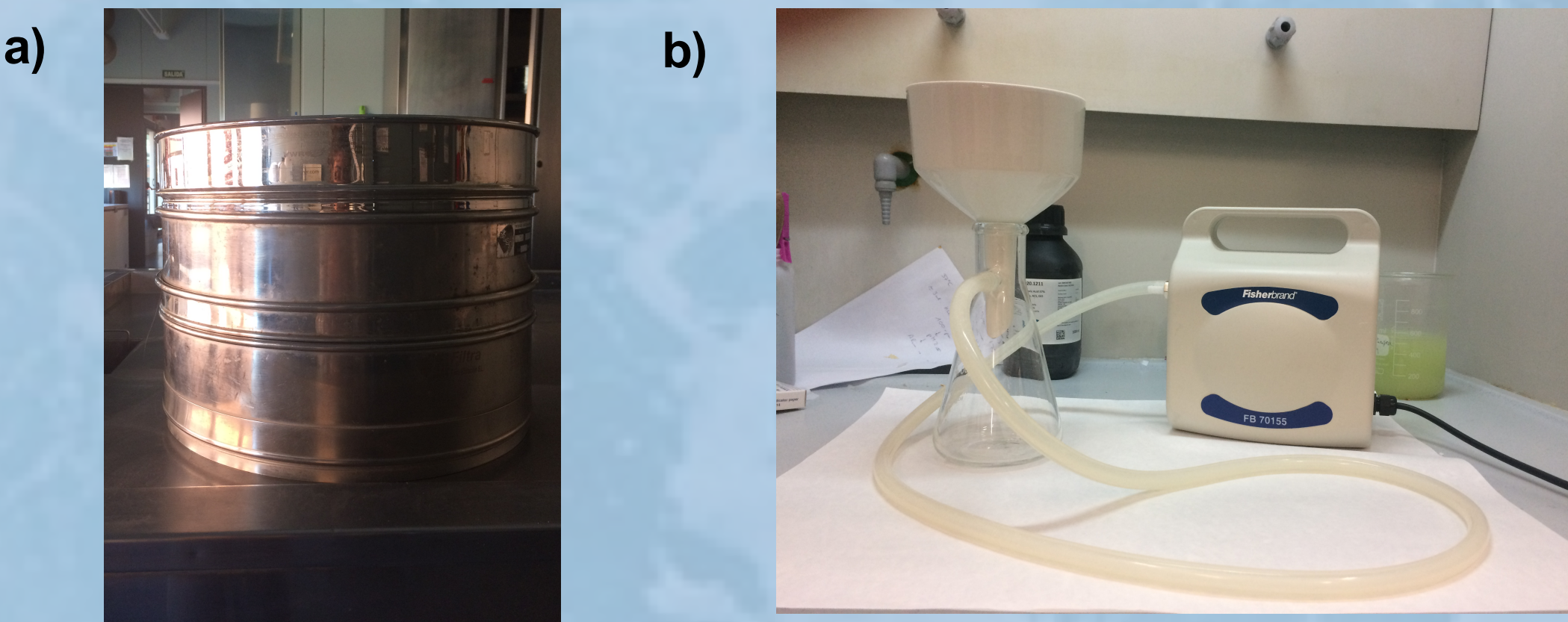


Fig 2. a) Size separation of digestive contents through sieves, b) vacuum filtration system (Büchner filtration).

RESULTS

Table 1. Main results on the comparison of microplastic content in the digestive tracts of loggerhead turtles (*Caretta caretta*) and striped dolphins (*Stenella coeruleoalba*).

	<i>Caretta caretta</i>	<i>Stenella coeruleoalba</i>
N	12	46
Frequency	83.3 %	90.5 %
Mean±SD items/individual	7.5 ± 8	14.9 ± 22.3
Median (just individuals with MPs)	3	7
% of fragments	56	37.8
% of fibres	44	73.6
Range (just individuals with MPs)	1 - 32	1 - 82

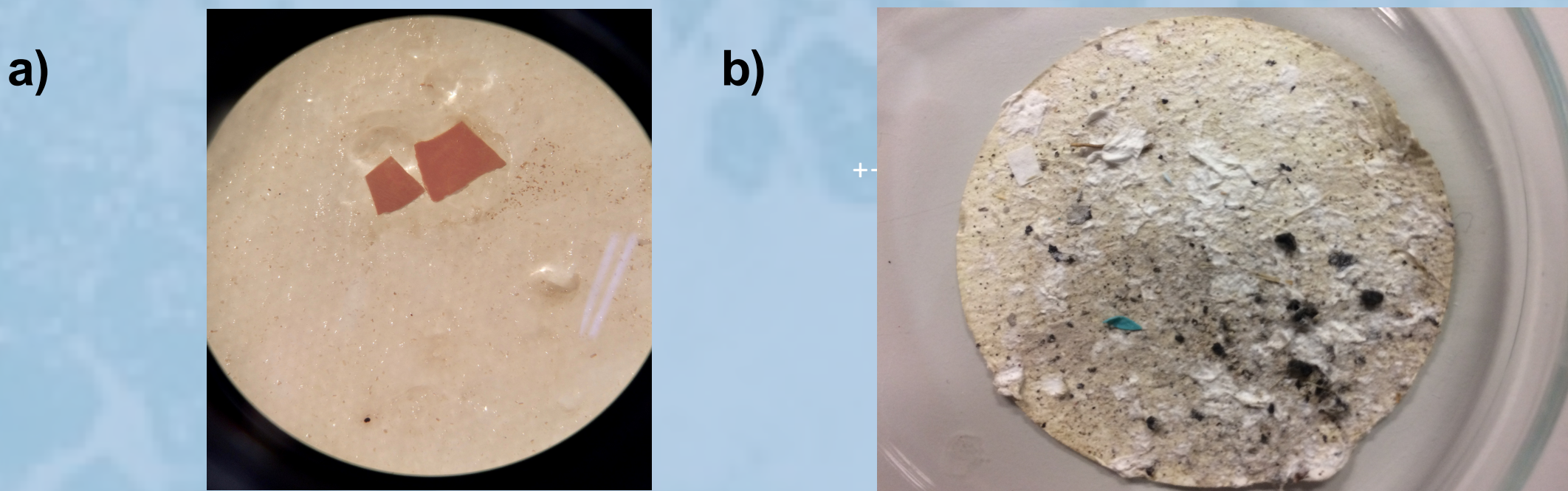


Fig 3. a) Microplastics found in *Caretta caretta* under stereomicroscope (60x), b) Blue microplastic and debris under naked eye.

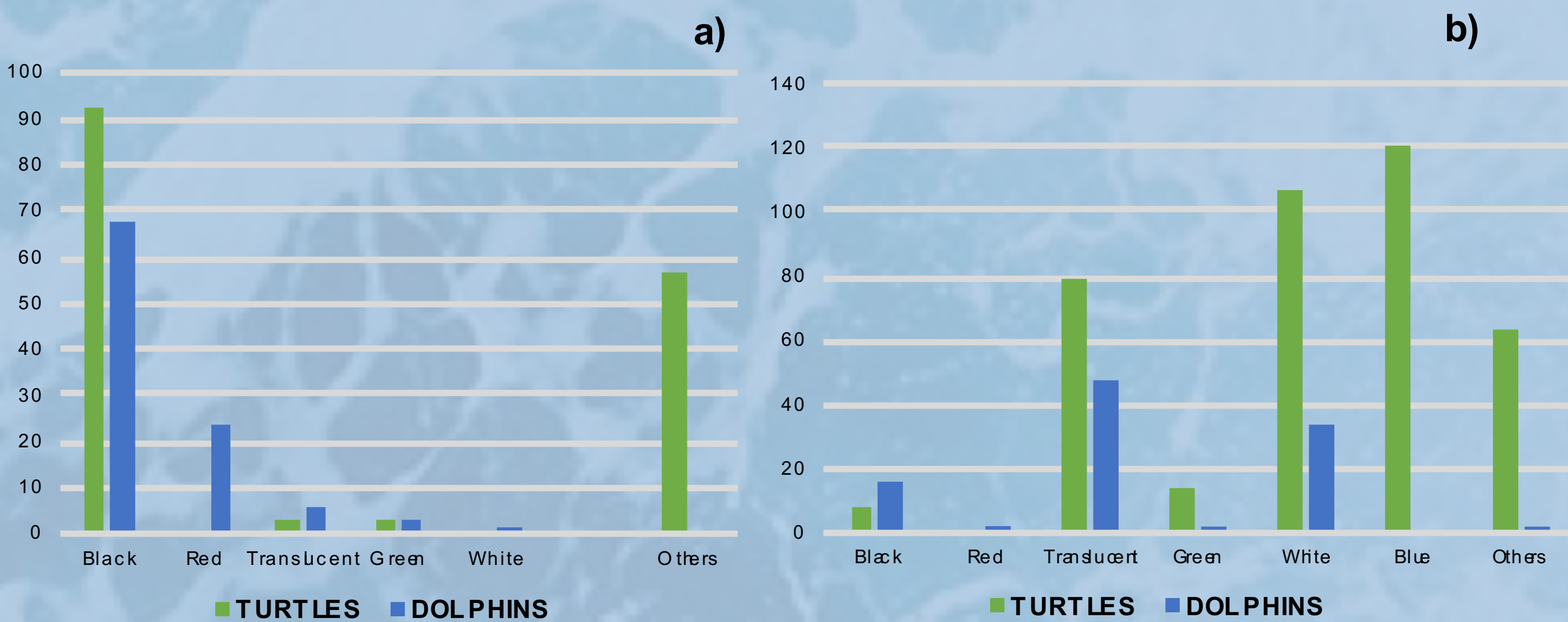


Fig. 4. Comparison of colour distribution of a) fibres and b) fragments in both species, loggerhead turtles and striped dolphins.

DISCUSSION & CONCLUSIONS

- 1. **Frequency was high in both species.** However, more data are needed to conclude that microplastics content in both species is significantly different.
- 2. Regarding **shape**, fragments were more frequent than fibres in turtles, and the contrary happened in dolphins. Despite of being this difference bigger in striped dolphins, in loggerhead turtles shape distribution is close to 1:1. Regarding **colour**, distribution varies greatly; but we could observe **black fibres were the most common**. Fragment colour distribution is more even and did not show any specific trend. Ongoing studies are going to include **FTIR analyses** in order to identify the **polymers** that build up these microplastics.
- 3. Higher variability in the amount of plastics was observed in **dolphins**, due to a **higher frequency of individuals not containing microplastics** and few individuals containing a lot.
- 4. Further research should focus on **whether microplastic intake could affect the fitness of both species**. It is essential to continue monitoring in order to have better knowledge about the role of plastics in marine ecosystems, as well as to be able to identify the most problematic plastics and act accordingly.
- 5. **Effort should be focused on reducing the amount of waste** reaching the sea through citizen education, public campaigns and proper industrial waste disposal.

References

Beckwith and Fuentes, 2018. *Marine Pollution Bulletin*. 131:32-37.
Gago et al. 2016. *Frontiers in Marine Science*. 3:219.
Lusher et al., 2014. *Environmental Pollution*. 199:185-191.
Miller et al. 2017. *Marine Pollution Bulletin*. 123:6-18.
Background picture: 27 mm, Enric Adrian Gener

Acknowledgements

We thank the Wildlife Service of the Conselleria d'Agricultura, Medi Ambient, Canvi Climàtic i Desenvolupament Rural of the Generalitat Valenciana for logistic and financial support. JT and JAR are supported by EU projects INDICIT and MEDSEALITTER (Interreg). ON is supported by a predoctoral grant FPU 2017 of the Ministry of Education, Culture and Sport of the Spanish Government. We also thank the staff of the Marine Zoology Unit for technical assistance during the survey and UNEP's RAC/SPA, IUCN and the 6th Mediterranean Conference on Marine Turtles for travel support.

