

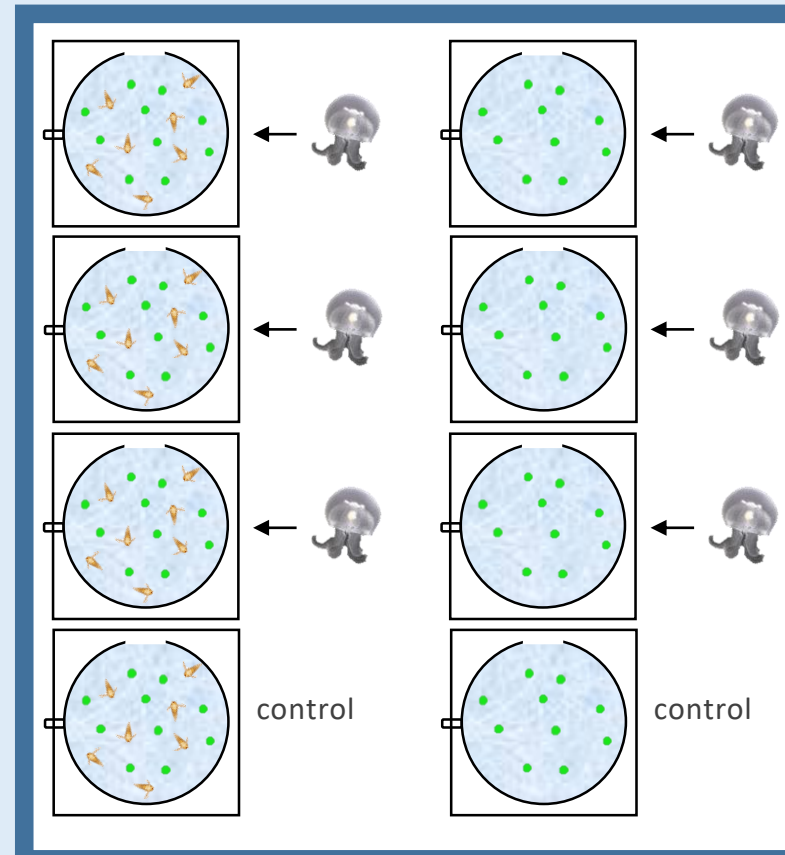
**Keywords:** Microplastic, microspheres, jellyfish, plastic pollution

## INTRODUCTION

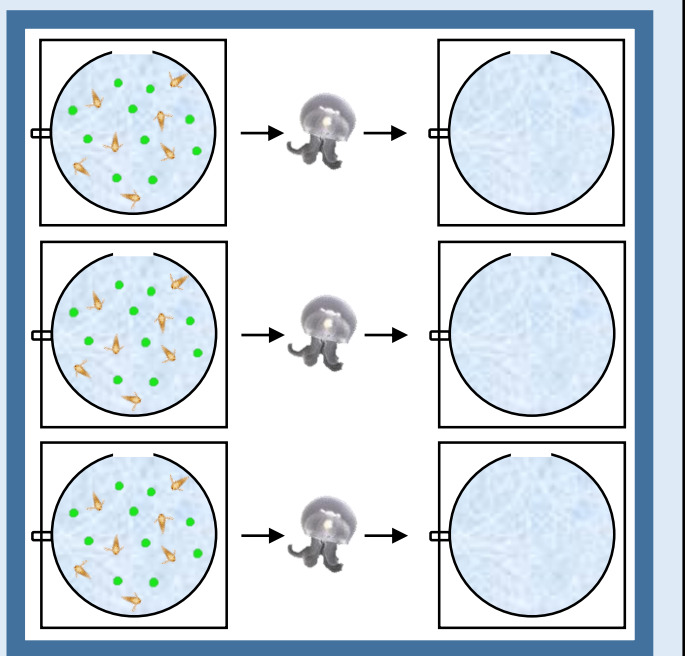
Plastic is an essential material for most industries in our society and its production increases every year. Part of that plastic ends at sea, where it can move around the world and stay even hundreds of years, affecting numerous living beings and altering ecosystems. As the plastic degrades, it fragments into smaller particles (<5 mm), forming what we know as microplastic. Both plastics and microplastics, affect the feeding, growth, reproduction and behavior of animals like fish, corals, turtles, bivalves or medusa, and can even be ingested and transferred along the food chain, affecting eventually humans. Microplastic and their effects are increasingly studied, but there is still much to investigate, specially its relationship with organisms such as jellyfish.

**OBJECTIVES:** Study the ingestion of plastic microspheres in cultures of *A. aurita*, and the effect of the concentration and presence of prey on ingestion.

## DATA & METHODS



Four 1.7 L plankton kreisel tanks were used for each concentration, one *A. aurita* individual was placed in three of them, leaving the fourth empty as control. Fluorescent plastic microspheres were added in concentrations of  $5000 \pm 326$ ,  $10000 \pm 652$  and  $20000 \pm 1034$  microspheres / L. Every 10 min during 8 h it was checked if the medusa had plastic inside their gastric cavity. The experiment was repeated using 500 48h-*artemia* nauplii at each tank.



To determine the retention time of the microspheres in the gastric cavity, three individuals of *A. aurita* were fed with 48h-*artemia* nauplii and same microspheres concentration than in previous experiment. After 30 min, they were placed separately into three seawater tanks and checked every 10 min to determine if they had still microspheres inside.

## RESULTS

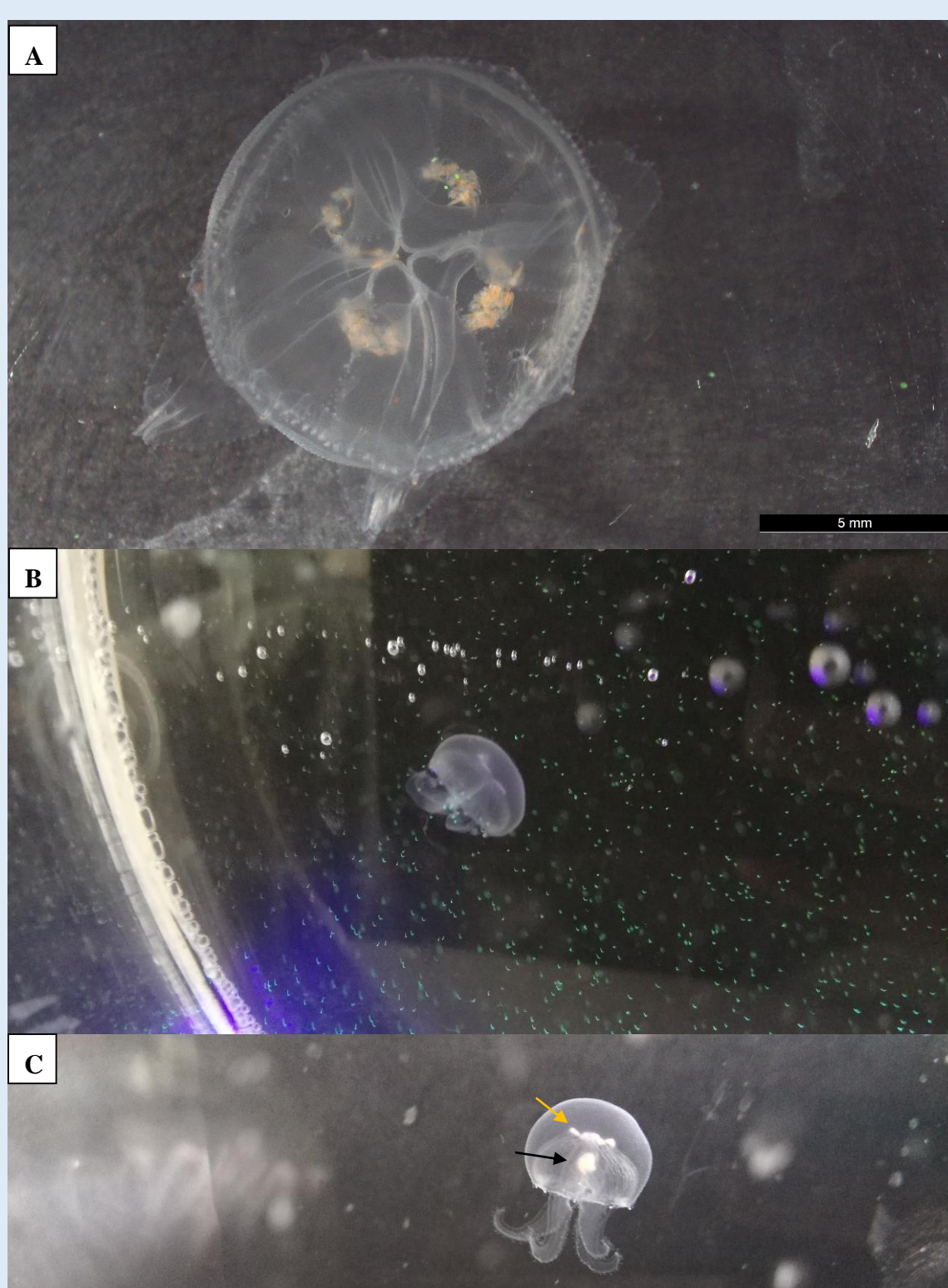


Figure 1. Ingested microspheres next to the nauplii in the gastric cavities (A). Adhered microspheres at 20000 microspheres / L to *A. aurita* (B). Ingested food in the manubrium marked with a black arrow and the aliment in the gastric cavities pointed with a yellow arrow (C).

Treatment	Ingestion	Average time of presence (min)	Retention time (min)	Average microspheres
5000 / L	✗	-	-	-
5000 / L + nauplii	✓	103.33 ± 136.67	150 ± 60	1 ± 1
10000 / L	✗	-	-	-
10000 / L + nauplii	✓	176.67 ± 16.67	166.67 ± 33.33	2
20000 / L	✗	-	-	-
20000 / L + nauplii	✓	226.67 ± 96.67	123.33 ± 33.33	3 ± 2

Table 1. Results obtained from the ingestión experiments.

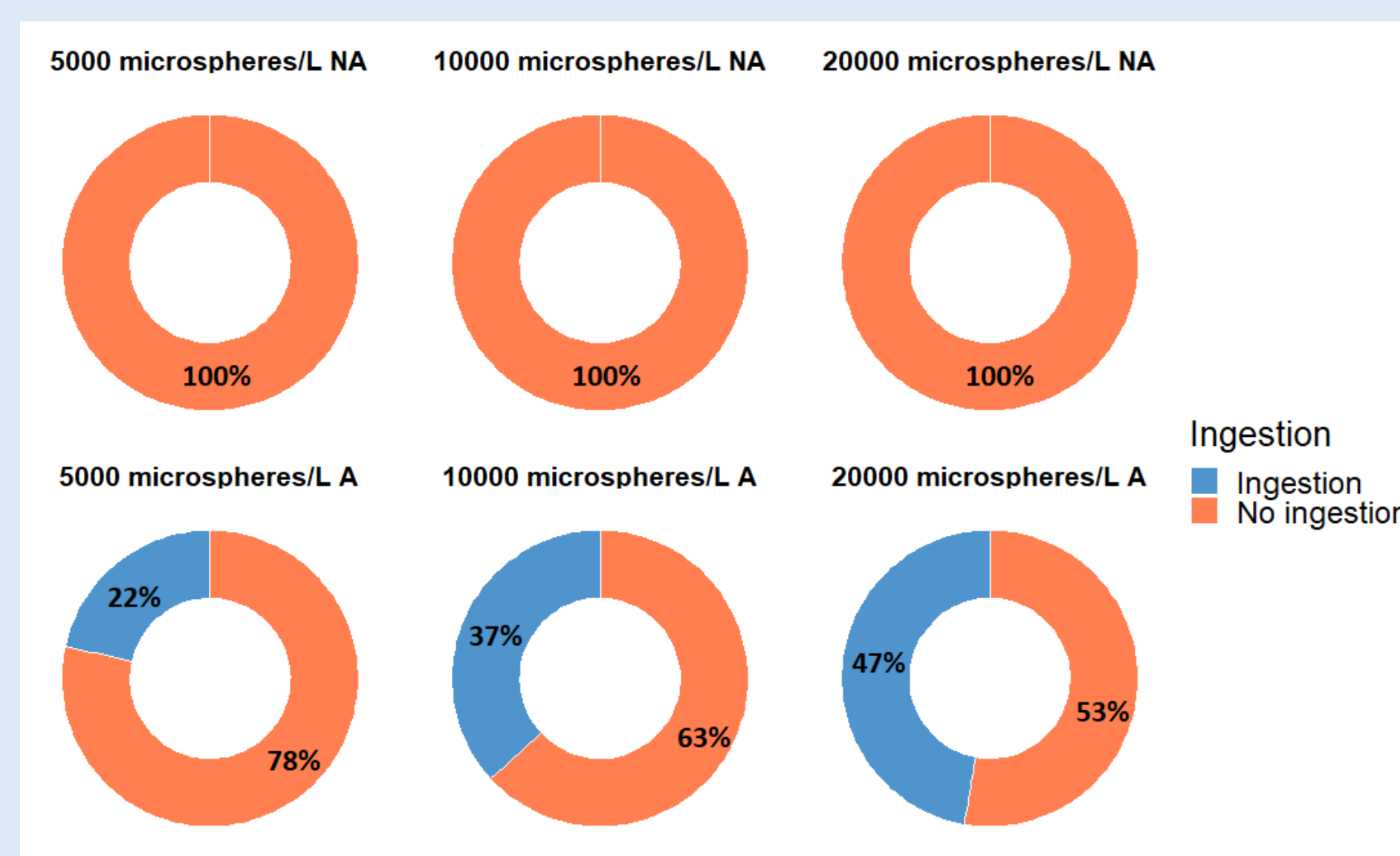


Figure 2. Ingestion of microspheres and percentage of the time with presence of microspheres in the gastric cavity.

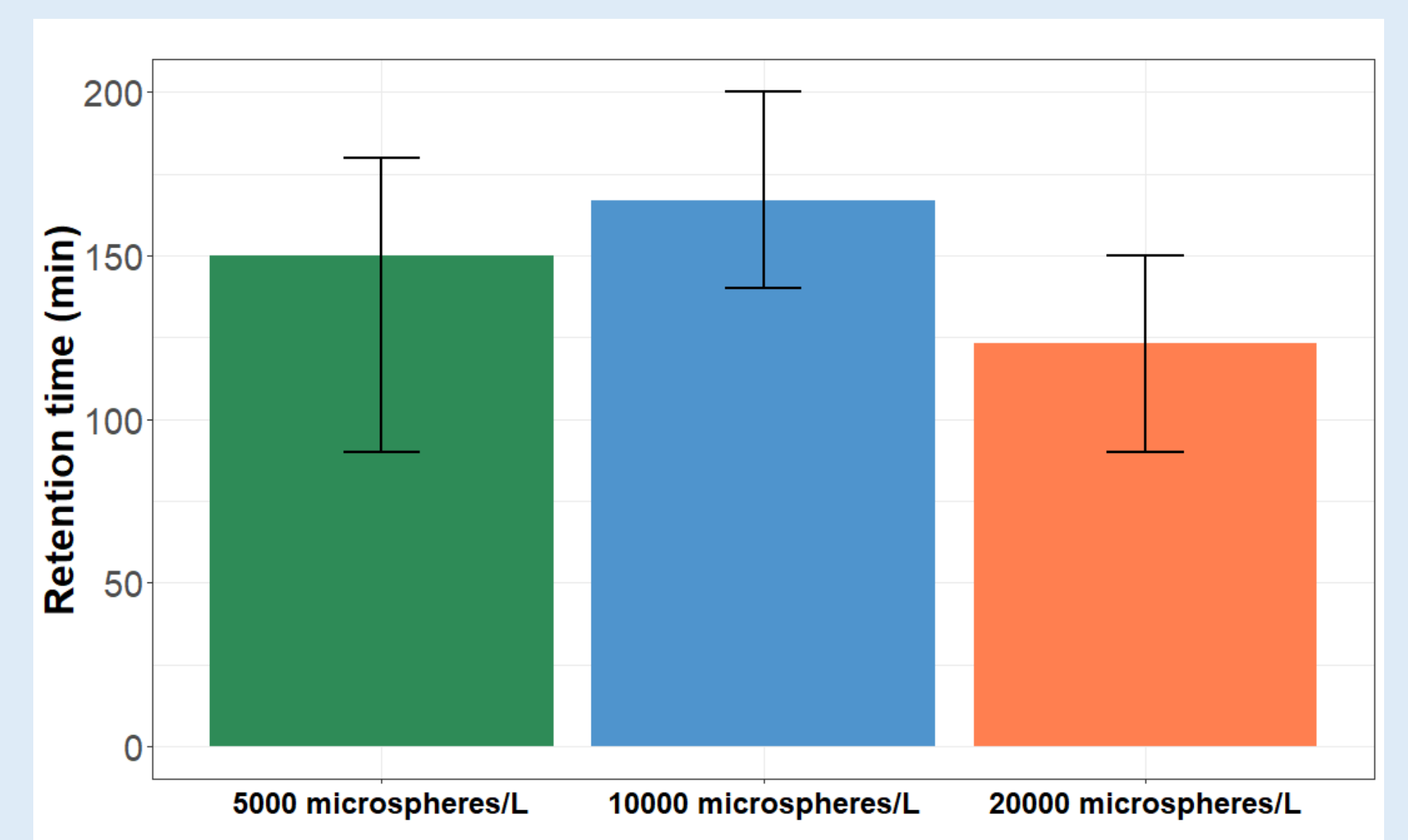


Figure 3. Retention time of microspheres for each concentration.

## DISCUSSION

It was clearly seen that in the absence of prey, *A. aurita* did not ingest the microspheres, although they did stick to the body, especially when increasing the concentration.

In these experiments, only those microspheres into the gastric cavities were counted as ingested since many did not reach the cavities, but they were expelled directly from the manubrium. This may be because organisms recognize that microspheres are not food and expel them, as consequence they do not eat the microspheres without the presence of prey.

The few microspheres ingested probably were by mistake, since having so many adhered, when they take the nauplii to the mouth some of these microspheres are also dragged.

The time that *A. aurita* present microspheres in the cavities seems to be independent to the concentration of these in the environment.

Time of presence of microspheres in the gastric cavities tends to increase with concentration, but the variability found among the different individuals was very large.

For the retention time, it does not seem to follow any trend and is not influenced by the concentration of microspheres. However, the number of microspheres ingested seems to tend to increase with concentration.

## CONCLUSIONS

- A. aurita* ingestion of microspheres only occurs when there is also presence of prey in the environment.
- Neither the average time of presence nor the retention time are affected by the concentration of microspheres in the environment, however the number of microspheres ingested increased at higher concentrations.
- Further studies are needed to understand the impact of microplastics on medusa and their physiological state.