



## INTRODUCTION

The subtropical crab *Percnon gibbesi* (H. Milne Edwards, 1853) of the family Plagusidae is naturally found in different regions and temperature ranges. In the eastern Pacific, it spans from California to Chile, while in the western Atlantic, it extends from Florida to Brazil. In the eastern Atlantic, it inhabits Madeira, the Azores, Morocco, Ghana, and the coastal islands of the Gulf of Guinea.

It is currently known to be an invasive species in the Mediterranean Sea, it could have reached this sea by maritime transport, due to human activities or aquaculture. It has established itself quite successfully, probably due to the absence of competitors, in added to its great ability to occupy diverse niches and its high fecundity and pelagic larval duration.

For all these characteristics, it is interesting to study the ability of this crab to withstand different temperatures.

This work aims to describe the thermal tolerance ranges of *P. gibbesi*, to understand the response of the species to global warming, in its native range and in no indigenous areas.

## METHODOLOGY

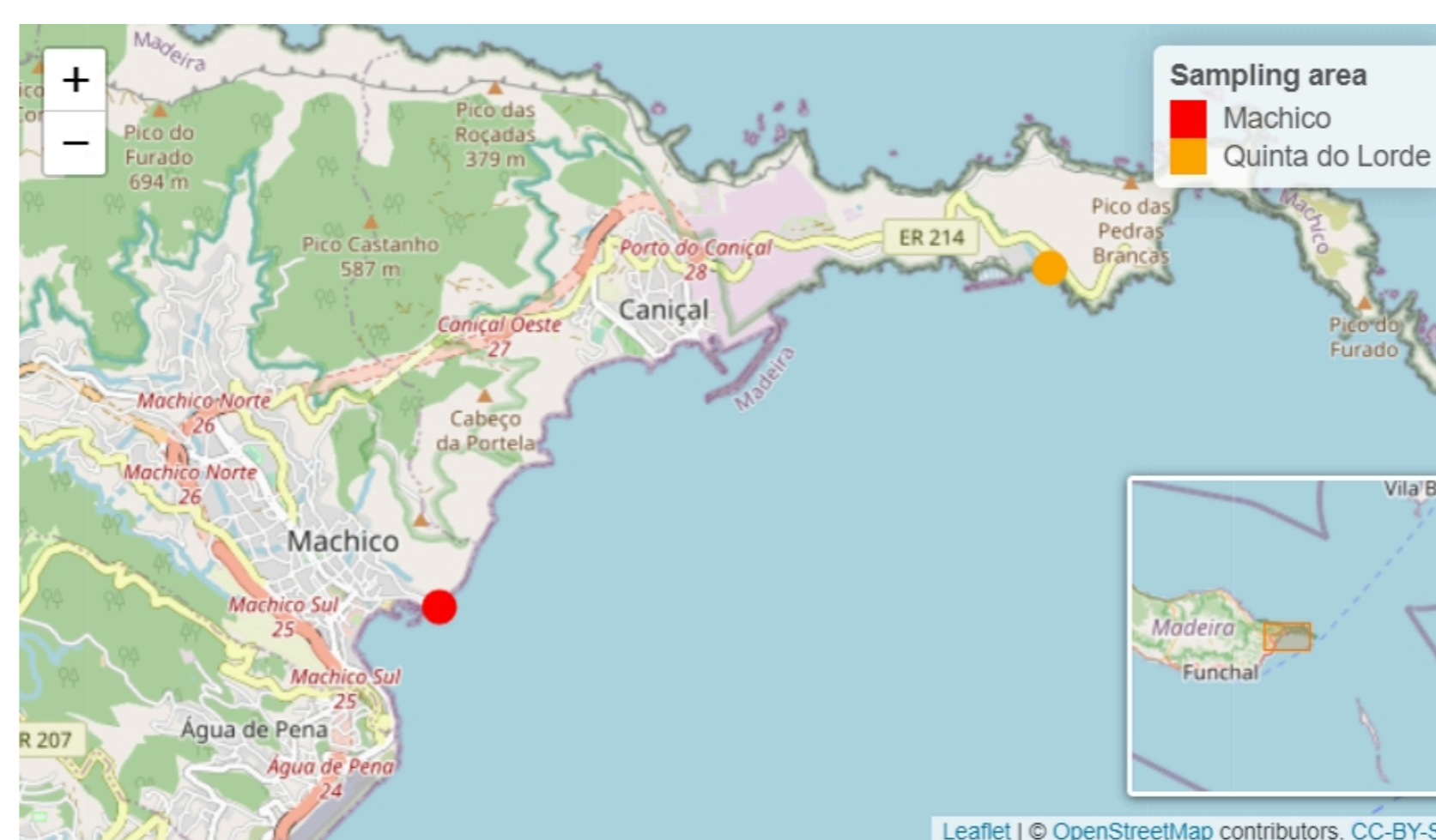


Figure 1. Location of the island of Madeira. Red point: Location of the sampling area in Machico. Orange point: Location of sampling area in Quinta do Lorde.

The study was carried out on Madeira Island, situated in the northeastern Atlantic Ocean.

An experiment was designed with 3 types of treatments, a warm treatment (W) by increasing temperatures, a cool treatment (C) by decreasing temperatures, and a control treatment (Control) at average seawater temperature (19°C). Every two hours the temperature was varied by 2°C, then, the temperature remained stable during the measurement.

For the measurement of oxygen concentration, we used an optode system (Presens Measurement Studio 2.4.0.0.2293).

At the end of the measure, the crabs were released back into their containers. This procedure was repeated until 35 degrees was reached in the warm tank and 8 degrees in the cool tank.

This experiment was replicated 3 times in total.

Figure 2. Graphical scheme of the experimental design carried out. A) Water bath tank's structure. B) Individual container. C) Real image of the containers during one of the experiments. Modified photo from (Bernal-Ibáñez et al., 2022)

## RESULTS AND DISCUSSION

The regression curve for the data set of the 3 experiments (Fig.3) presents a clear decrease in oxygen consumption below 19 °C. *Percnon gibbesi* seems to adapt well to cold temperatures, at least observing the results, it could remain in waters of 13 °C and survive. This species is present on the Chilean coast where it currently lives in the northernmost area and where temperatures are around 12.7°C, based on these results, this species would not be affected by temperature increases in their colder habitats.

Above 19 °C the regression curve acts differently, first, the oxygen consumption increases up to about 27 °C as shown in Figure 3, but as the temperature increases above 27°C the curve decreases and the individuals collapse (Fig.4), and respiration decreases until reach organic failure. This crab lives in California or the Mediterranean Sea where the average temperature is 22~24°C.

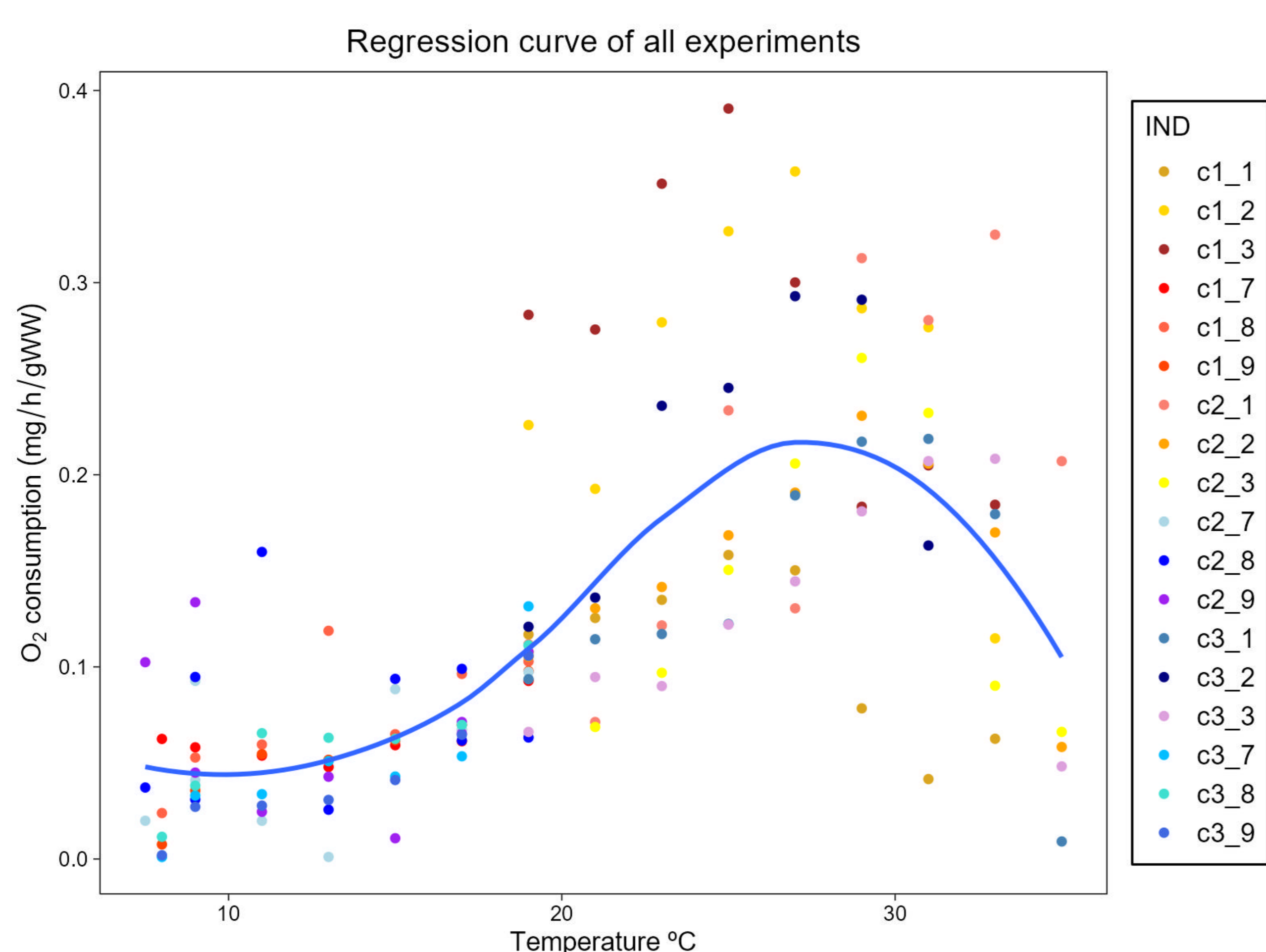


Figure 3. Regression curve of the respiration values ( $O_2$  consumption (mg/h/gWW)) of all the crabs in the 3 experiments.

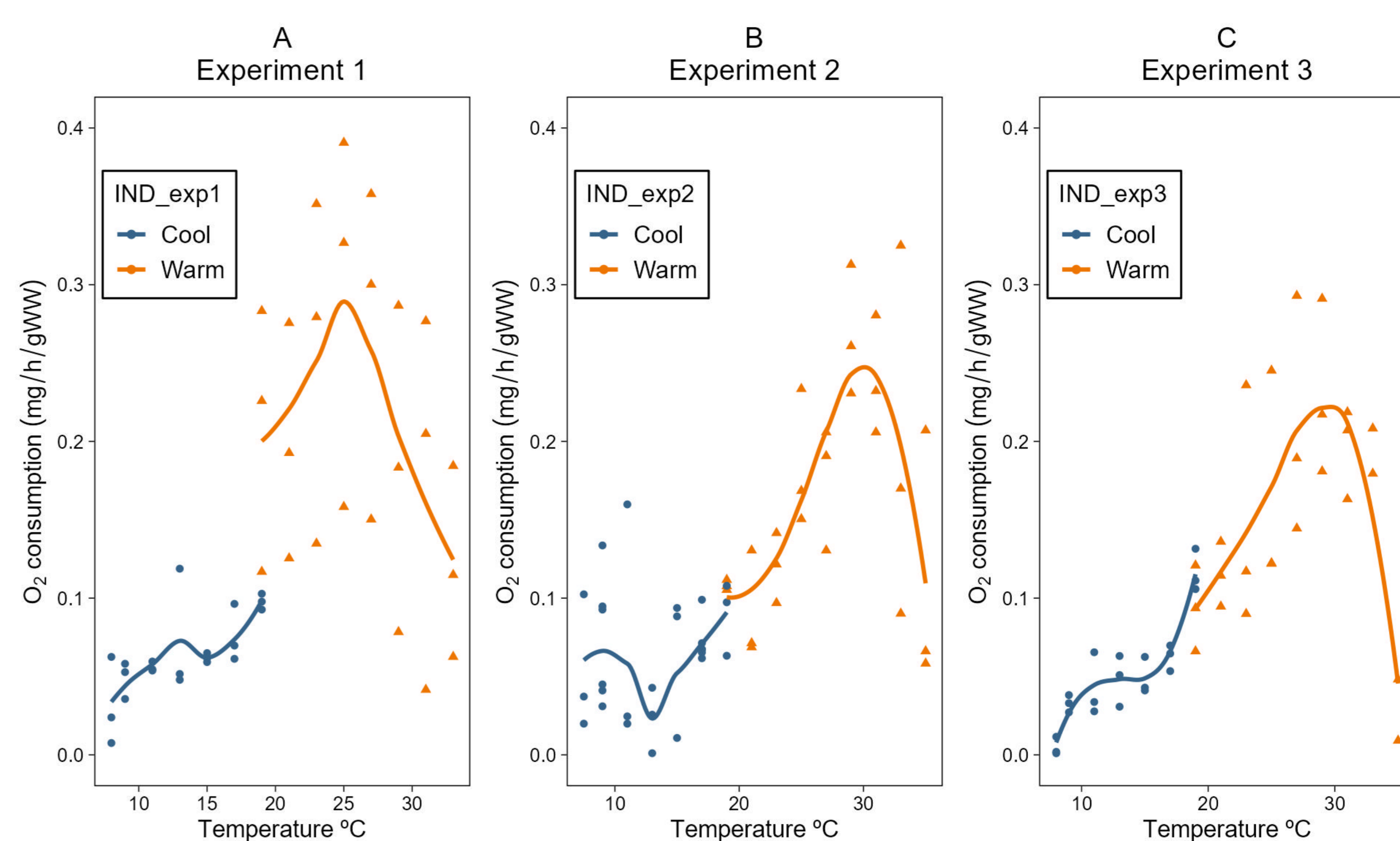


Figure 4. Regression curve of the individual's respiration by experiment. The warm treatment of each experiment is represented in orange. The cool treatment of each experiment is represented in blue. A) Experiment 1. B) Experiment 2. C) Experiment 3. IND\_exp refers to the individuals of that experiment.

## CONCLUSIONS

- *Percnon gibbesi* is a species with a **wide range** of temperature tolerance between **13 and 27°C**.
- This tolerance is higher in **warm** temperatures than in cold temperatures.
- With the effect of global change in ocean temperatures, they could **disappear** from their warmer habitats.



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