Impact of warming and acidification of the Mediterranean Sea on the balance organ of the scyphozoan jellyfish Rhizostoma pulmo

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The marine environment is one of the main carbon dioxide sinks in nature. However, the removal of CO2 from the atmosphere has a negative impact on the aquatic system by decreasing the pH of the seawater, threatening organisms and biogeochemical cycles through the phenomenon known as ocean acidification. Along with the increase in water temperature, both are processes whose occurrence has increased alarmingly in recent decades. In this study, we analyze the effects of both individual and combined increases in temperature and acidification on the structures responsible for the equilibrium (statoliths) of newly released ephyrae of the Mediterranean Jellyfish R. pulmo. These structures are essential for the correct development and adaptation of the organisms in the marine environment, so their malformation could mean a decrease in their survival capacity and also could end up impacting negatively the planktonic food webs. In this work, six combinations of temperature and PCO2 (18ºC, 24ºC and 30ºC with a PCO2 of 500 ppm and 1000 ppm each), according to the projections of the SSP5 -8.5 (IPCC 2021) scenario for the year 2100, were applied during 32 days to different groups of polyps. Statoliths of the released ephyrae were counted and their size was measured. Our results suggest the variation of both variables influence on the size of the structures, where the increment of temperature causes the synthesis of bigger statoliths, while the increment of PCO2 is responsible of the production of smaller structures. The way in which the development of different sized statoliths under warming and acidification conditions affect the equilibrioception and adaptation capacity of R. pulmo, as well as how it may impact the ecosystem of a warmer and more acidic Mediterranean is currently under study.