Antarctic bryozoans give hints of environmental changes in oceans

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Antarctic regions are natural laboratories to study biodiversity and the impact of climate change. Credit: Blanca Figuerola, UB-IRBio

Antarctic regions are natural laboratories to study biodiversity and the impact of climate change. In Antarctica, some marine ecosystems are particularly vulnerable to ocean acidification due to an excess of CO2 released into the atmosphere. Studying Antarctic bryozoans offers new understanding of the effects of global ocean acidification.

This is one of the conclusions of an article published in the journal *Marine Ecology Progress Series* by Blanca Figuerola, researcher at the Department of Evolutionary Biology, Ecology and Environmental Sciences and Biodiversity Research Institute of the UB (IRBio), Piotr Kuklinski (Institute of Oceanology) and Paul D. Taylor (Natural History Museum, UK).

Ocean acidification: a threat to marine organisms

At a global level, the excess of atmospheric CO2 is absorbed by ocean waters, causing changes in water chemistry (pH decrease or ocean acidification). "The marine calcifiers that live in polar regions are particularly vulnerable to the effects of ocean acidification, a process which is reducing their mineralization capacity and forming calcium carbonate (CaCO3) skeletons used as a protective and supporting structure against predators," says Blanca Figuerola, main author of the scientific study.

In these species, the mineralization capacity depends on the concentrations of calcium carbonate (CaCO3) dissolved in the water column, and the temperature and pressure of these waters. In particular, cold waters of the Southern Ocean show higher concentrations of CO2 and lower in CaCO3, and this reduces the availability of the carbonate required for the calcification process.

Studying bryozoan skeletal mineralogy

The scientific team has studied the global effects of ocean acidification in four Antarctic bryozoan species (Fasciculipora ramosa, Lageneschara lyrulata, Systenopora contracta and Melicerita obliqua), widespread and abundant around Antarctica in a range of depths. In addition, these species incorporate significant amounts of magnesium into their skeletons. According to Figuerola, "The skeletons with significant amounts of Mg are even more soluble and consequently, more susceptible to the ocean acidification than skeletons containing low Mg-levels."

The conclusions of the new project, which address depth-related changes in the levels of magnesium in Antarctic bryozoans for the first time, suggest that other environmental and biological factors (other than pH) could have a more important influence on the incorporation of Mg into the skeleton of these organisms. "Only Fasciculipora ramosa shows significant variability in Mg content in diverse depths, and this makes us think that other environmental and biological factors can have a variable influence depending on the species", says Blanca Figuerola.

"We now need to test this hypothesis in other species and in the same studied species too but in wider depth ranges and in other Antarctic areas because the minimum pH value can vary in depth depending on the area they are. With all this, we want to evaluate the bathymetric variability in the Mg content because factors related to depth have the potential to provide an analogue for future changes in the skeletal mineralogy of calcifying marine organisms. This is due to the ocean pH decreases in depth (with a minimum value of

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