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Effects of ocean acidification on the development of sea urchin larvae
A latitudinal study of northern and southern populations along the Atlantic coast

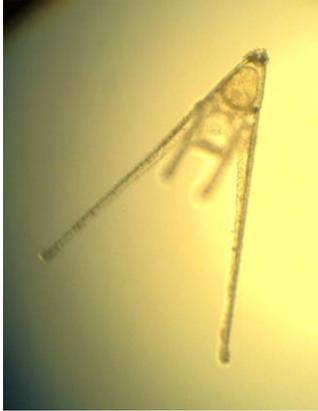
While many people understand that the carbon dioxide (CO₂) released by humans into the atmosphere is a main cause of global warming, few know that this CO₂ influx is causing another problem: ocean acidification. Atmospheric carbon dioxide is increasingly being absorbed into the world's oceans, which increases the acidity of the water and decreases the availability of calcium carbonate, the main building block of marine skeletons. A decrease in the availability of calcium carbonate will therefore have potentially drastic effects on marine ecosystems. Ocean acidification is already negatively affecting organisms, as demonstrated by events like coral bleaching, where rising acidity of the ocean causes corals, and therefore the diverse communities they support, to die off.

Kaelyn Lemon, an undergraduate at Macalester College, is researching the effects of ocean acidification on sea urchin larvae. Sea urchins are often the main plant eaters in their communities, and many species are consumed by people. Furthermore, sea urchins are often used to understand development in other animals. According to Lemon's mentor at the College of Charleston, Dr. Robert Podolsky, "The early developing stages of marine organisms are critical to study because their small size and simple anatomy make them especially vulnerable to changes in water conditions like temperature and acidity." Because sea urchin larvae have skeletons made of calcium carbonate, their growth can be affected by ocean acidification.

In the Podolsky lab, Lemon is raising sea urchin larvae of the species *Arbacia punctulata* collected from both Massachusetts and South Carolina. She is growing them under present and predicted future atmospheric CO₂ levels to understand whether larvae from different latitudes experience the effects of CO₂ on growth differently. If ocean acidification affects each population differently, it would suggest that the genetic makeup of the populations plays a role in determining their resistance to future changes. The possibility that some populations are genetically more resistant to increases in CO₂ could help to mitigate to some extent the negative effects of ocean acidification on the species.

Lemon is one of ten selected students participating in the National Science Foundation (NSF)'s Research Experience for Undergraduates (REU) program at the College of Charleston. To learn more about the CofC REU program visit <http://reu.cofc.edu/>

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A magnified image of an *A. punctulata* larva at the 4-arm "pluteus" stage, when growth is measured in the experiment. Photo credit: Kaelyn Lemon



The experimental set-up: each jar holds sea urchin larvae from a single population developing under different temperature and CO₂ levels. Photo credit: Kaelyn Lemon

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