The New York Times

As CO2 Increases In Ocean, Sea Snails More Likely To Hide Than Try To Thicken Shells

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Published: November 6, 2007

Climate change may get the most publicity, but it's not the only global phenomenon linked to rising levels of carbon dioxide in the atmosphere. Another is the gradual acidification of the oceans, as more of CO_2 dissolves in seawater, creating carbonic acid and lowering the pH.

The effect is only now being studied in a systematic way. Most of the work so far has looked at direct impacts — whether a slightly more acidic environment affects the physiology of marine creatures, particularly those that create shells or other structures using calcium carbonate. Simon Rundle and colleagues from the University of Plymouth in England conducted a different kind of study, looking for indirect effects on behavior. Their work, published in Biology Letters, shows that increasing acidity disrupts the defense mechanisms of the common periwinkle, Littorina littorea.

These sea snails, Dr. Rundle said, respond to the presence of crab predators by doing one of two things: thickening their shells (to better withstand the crush of a crab claw) or practicing "avoidance behavior," crawling out of sight. Shell-thickening is believed to be initiated when the snails sense some chemical cues in the water emitted by the crabs.

Dr. Rundle and his colleagues found that more acidic seawater, on its own, had no effect on shell thickness. But when crab cues were introduced, snails in normal water increased shell thickness markedly. In more acidic water the process was disrupted, and little or no thickening occurred.

"The important thing we found is that until you start looking at these defenses, you don't see an effect of this ocean acidification," Dr. Rundle said.

The researchers found that periwinkles in the more acidic environment increased their avoidance behavior. "There's almost this idea of a tradeoff," Dr. Rundle said. "Because the thickening wasn't there, they were then 'deciding' to use avoidance." That, in turn, may affect how the snails interact with other marine life. So a "simple" increase in acidity may have a not-so-simple impact on ecosystems.