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UCSB Receives Grant to Study Ocean Acidification

UC Santa Barbara is part of a West Coast network of researchers that has received a grant of nearly $1.1 million from the National Science Foundation to analyze the ecological and biological response to ocean acidification in the California Current System.

With increasing levels of carbon dioxide accumulating in the atmosphere and moving into marine systems, the world's oceans are becoming more acidic.

"The big question is whether species will be able to adapt to future levels of ocean acidification," said Gretchen Hofmann, a marine biologist and professor in UCSB's Department of Ecology, Evolution, and Marine Biology.

The researchers will focus much of their attention on the mussel, Mytilus californianus, which is a widespread component of the rocky intertidal zone, and an important test subject for understanding ocean chemistry changes. Their previous research found that the growth, survival, and shell strength of the mussel larvae are significantly affected in a negative way by elevated levels of carbon dioxide in the ocean water.

In contrast, Hofmann and colleagues have found that purple sea urchins, Strongylocentrotus purpuratus, have the potential to adapt. Surprisingly, they found that resiliency had a strong genetic component. "Purple urchin larvae are resilient in

the face of ocean acidification due to the standing genetic variation that exists in the population," she said.

Species exposed to greater variation in environmental conditions may have greater genetic variation with which to rapidly evolve, according to Hofmann. "One thing we don't know is whether it is possible to push urchins to the guardrails of their tolerance as oceans acidify in the future," she said. "How much is too much?"

The researchers will conduct field and laboratory experiments across a network of 10 nearshore ocean acidification monitoring sites that span 1,400 kilometers of coastline.

By combining experiments with a sensor network that will continuously measure ocean pH changes, the researchers will be able to examine the sensitivity and potential resilience to ocean acidification among mussel populations that are spread along much of the West Coast.

"In order to make predictions about how coastal species may respond to future ocean conditions, we need to be able to understand the natural range and variability of pH conditions in the very nearshore environment, where many ecologically and economically important species occur," said Carol Blanchette, an associate research biologist with UCSB's Marine Science Institute. "Building and maintaining our network of nearshore pH sensors will provide information on the conditions that these organisms are currently experiencing, as well as allowing us to measure how these conditions will change over time."

The West Coast network includes researchers from Oregon State University; UC Davis; Monterey Bay Aquarium Research Institute; UC Santa Cruz; and the University of Hawaii, Manoa.

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Gretchen Hofmann

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