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Small Sea Creatures May Be the 'Canaries in the Coal Mine' of Climate Change

As oceans warm and become more acidic, ocean creatures are undergoing severe stress and entire food webs are at risk.

The information was presented by scientists at a press briefing on February 17 at the annual meeting of the American Association for the Advancement of Science in Boston.

Gretchen Hofmann, associate professor of biology at the University of California, Santa Barbara, has just returned from a research mission to Antarctica where she collected pteropods, tiny marine snails the size of a lentil, that she refers to as the "potato chip" of the oceans because they are eaten widely by so many species. The National Science Foundation's Office of Polar Programs funded the expedition.

Pteropods are eaten by fish that are in turn consumed by other animals, such as penguins. As these small creatures are stressed by an increasingly acidic ocean, due to the build-up of carbon dioxide in the atmosphere, they are less able to cope with a warmer ocean.

"These animals are not charismatic but they are talking to us just as much as penguins or polar bears," said Hofmann. "They are harbingers of change. It's

possible by 2050 they may not be able to make a shell anymore. If we lose these organisms, the impact on the food chain will be catastrophic."

Hofmann is a molecular ecologist who studies how genes go off and on as certain marine animals work to make their calcium carbonate shells from the seawater they live in. She characterized her recent trip to Antarctica as an urgent research mission.

She has performed extensive studies of the sea urchin that lives in the kelp forests of California. Sea urchins are a vital part of the food web and play a major economic role in California fisheries, since the roe of the sea urchin is a valuable sushi called "uni."

Hofmann explained that as marine invertebrates deal with increasing acidity, the larvae have to "re-tune" their metabolism in order to still make a shell. But this is done at a cost. The physiological changes that are a response to the acidity make the animals less able to withstand warmer waters, and they are smaller.

"These observations suggest that the 'double jeopardy' situation -- warming and acidifying seas -- will be a complex environment for future marine organisms," she said.

Hofmann is studying levels of carbon dioxide that would result from what the Intergovernmental Panel on Climate Change (IPCC) predicts would occur if humanity continues on a "business as usual" scenario projected out to the year 2100.

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