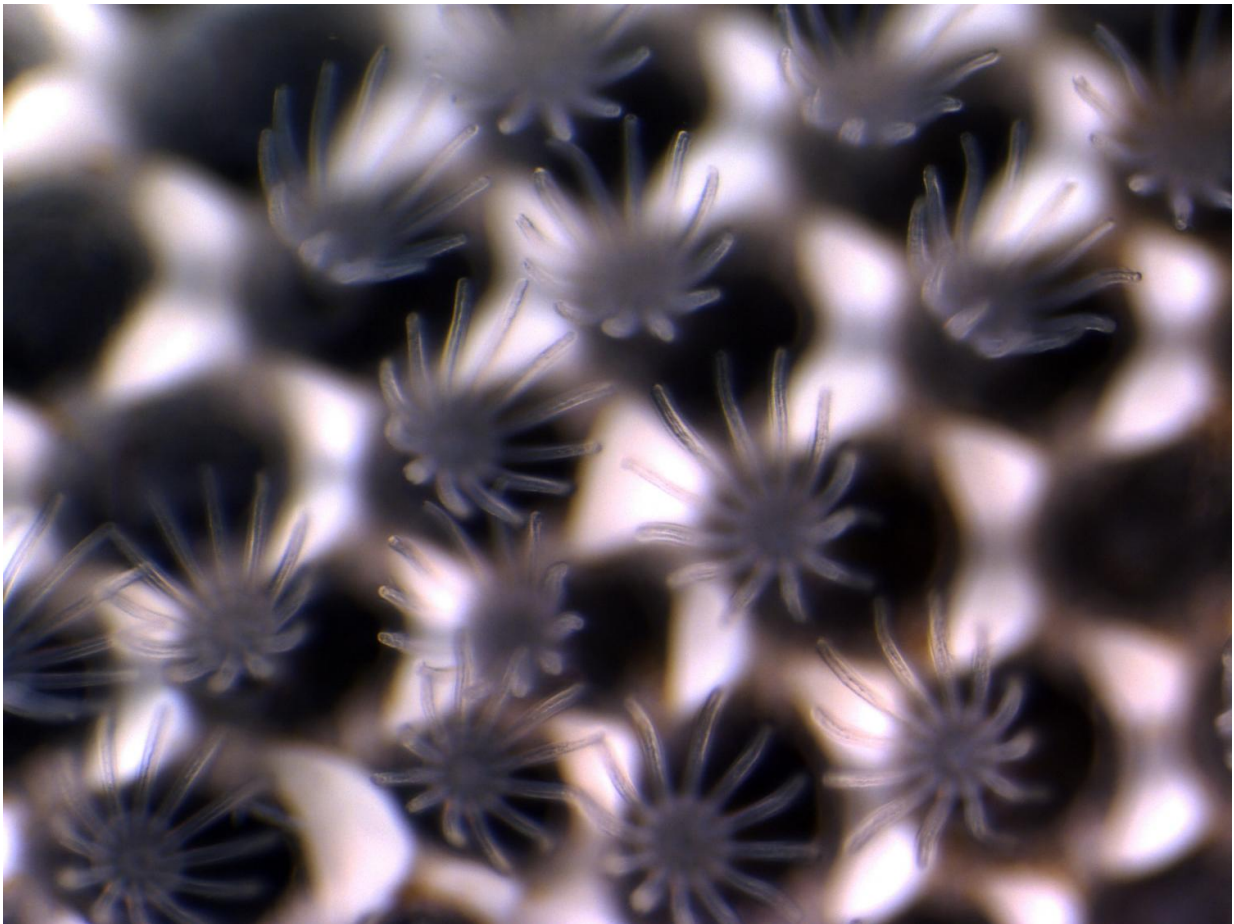


Canary in the kelp forest: Sea creature dissolves in today's warming, acidic waters

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When raised in warm water and exposed to acidic water, bryozoans, honeycomb-shaped sea creatures, dissolved within two months, researchers observed. Credit: Eric Sanford/UC Davis

The one-two punch of warming waters and ocean acidification is predisposing some marine animals to dissolving quickly under conditions already occurring off the Northern California coast, according to a study from the University of California, Davis.

In the study, published in the journal *Proceedings of the Royal Society B: Biological Sciences*, researchers at the UC Davis Bodega Marine Laboratory raised bryozoans, also known as "moss animals," in seawater tanks and exposed them to various levels of water temperature, food and acidity.

The scientists found that when grown in warmer waters and then exposed to acidity, the bryozoans quickly began to dissolve. Large portions of their skeletons disappeared in as little as two months.

"We thought there would be some thinning or reduced mass," said lead author Dan Swezey, a recent Ph.D. graduate in professor Eric Sanford's lab at the UC Davis Bodega Marine Laboratory. "But whole features just dissolved practically before our eyes."

Skeletons key

Bryozoans are colonial animals, superficially similar to, but not related, to corals. They are abundant in California kelp forests and are calcareous, meaning they build their honeycomb-shaped skeletons from [calcium carbonate](#).

The scientists found that when raised under warming conditions, bryozoans altered their chemical composition by building higher levels of magnesium into their skeletons, particularly if they were also eating less food. When exposed to acidic conditions already observed off coastal California, these changes predisposed the animals to dissolve.

The researchers consider bryozoans a canary in the coal mine for other [marine animals](#) that build calcareous skeletons containing magnesium. These include sea stars, sea urchins, calcifying algae and tube-building worms.

The authors do not know why the bryozoans added more magnesium to their skeletons under warmer temperatures. But they conclude that marine organisms with skeletons made of high-magnesium calcite may be especially susceptible to [ocean acidification](#) because this form of calcium carbonate dissolves more easily than others.

Bryozoans grow in connected colonies. During the experiments, the animals shut down parts of themselves when undergoing the stress of [ocean](#) acidification, redirecting their energy to new growth. This was somewhat like closing down units of a condominium complex while building new ones at the same time. But the moss animals could not outpace the dissolution.

"They were trying to grow but were dissolving at the same time," Swezey said.

Calcified animals increasingly vulnerable

The authors said the study underlines the increasing vulnerability of calcified [animals](#) to ocean acidification, which occurs as the ocean absorbs more atmospheric carbon emitted through the burning of fossil fuels.

During the spring and summer months, deep ocean water rich in carbon dioxide periodically wells up along the California coast when surface waters are pushed offshore by strong winds. These [upwelling](#) events also push nutrients to the surface to help support kelp forests and productive fisheries. However, this deep water tends to be more acidic.

Climate modeling shows that the trends of warming ocean temperatures, stronger winds and increasingly strong upwelling events are expected to continue in the coming years as carbon dioxide concentrations in the atmosphere increase. This indicates that acidic conditions will likely become more common, rather than episodic.

Marine life faces many changes at once

"Marine life is increasingly faced with many changes at once," said co-author Sanford, a professor in the UC Davis Department of Evolution and Ecology. "For [bryozoans](#), their response to warmer temperature makes them unexpectedly vulnerable to ocean acidification. The question now is whether other marine species might respond in a similar way."

More information: Interactive effects of temperature, food, and skeletal mineralogy mediate biological responses to ocean acidification in a widely distributed bryozoan, *Proceedings of the Royal Society B*, [rspb.royalsocietypublishing.org1098/rspb.2016.2349](https://royalsocietypublishing.org/doi/10.1098/rspb.2016.2349)

Provided by UC Davis

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