



Climate change remains a real threat to corals

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This is the coral before the UB researchers induced bleaching.

(PhysOrg.com) -- Hopes that coral reefs might be able to survive, and recover from, bleaching caused by climate change may have grown dimmer for certain coral species, according to new research by University at Buffalo marine biologists published online this week in *PLoS One*.

The research shows, for the first time, that while hard corals can take up from the environment new stress-tolerant algae that provide critical nutrients, the [coral](#) may not be able to sustain the relationship with these algae over a long period, a process known as symbiosis.

The findings may mean that certain types of coral will not be able to adapt rapidly enough to survive global warming, says the study's lead author, Mary Alice Coffroth, PhD, UB professor of geological sciences in the College of Arts and Sciences.

"Our findings suggest that not all corals can maintain a long-term symbiosis with these stress-tolerant strains of algae," she says.

"That's the problem," Coffroth continues, "if they can't take up the stress-tolerant symbionts, or if they take them up but can't maintain the symbiosis with them, as we found, then they likely won't be able to adapt rapidly enough to survive global warming."

The demise of coral reefs will deprive fish of food and shelter, severely threatening reef [fish populations](#) and marine diversity.

Co-authors on the paper include Eleni L. Petrou, a recent UB Honors College undergraduate who worked in Coffroth's lab, as well as Daniel M. Poland, a recent PhD graduate, and Jennie C. Holmberg, a former graduate student, both of whom worked in Coffroth's lab, and Daniel A. Brazeau, research associate professor in UB's Department of Pharmaceutical Sciences.

During the past two decades, Coffroth explains, [coral reefs](#), known as the rain forests of the sea for their incredible [biological diversity](#), have suffered bleaching events due to high [water temperatures](#) and light levels that cause them to literally "spit out" their algal symbionts, which

provide their sustenance. Severe bleaching can lead to coral death.

In recent years, though, it has been reported that some corals appear to respond to rising sea temperatures by acquiring new stress-tolerant symbionts from the environment, which could allow them to survive the warmer oceans caused by [climate change](#).



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Three weeks after the heat stress was removed, the coral still has not recovered its symbionts.

Coffroth says that the UB research shows that while the corals they studied were able to acquire new stress-tolerant symbiont strains from the water, they were unable to maintain that symbiosis for very long.

After about five weeks, the proportion of new symbionts within the coral had declined dramatically and after 14 weeks was no longer detectable in the corals.

"While it's true that coral can be flexible in the kinds of symbionts they take up, that will only work within limits," she says. "It's possible that the new symbionts were either unable to multiply in the host or to compete with the existing residual populations of symbionts in the coral.

"Our findings suggest that if a coral doesn't naturally host this kind of stress-tolerant symbiont, it cannot acquire it from the environment."

She noted that the outlook may be more promising for corals that naturally harbor the stress-resistant symbionts. These symbionts appear to be able to protect corals from sea temperatures that are one-to-two degrees higher than normal; however, Coffroth cautions that most estimates predict that by the year 2100, global warming will cause sea temperatures to rise by as much as two-to-six-degrees above current temperatures.

The UB researchers studied *Porites divaricata*, a common shallow-water scleractinian coral found throughout the Caribbean.

The coral samples were retrieved from a site within the Florida Keys National Marine Sanctuary;

in the laboratory, the scientists induced bleaching by exposing the coral to incremental increases in water temperatures until it reached 33 degrees C, about 91 degrees F.

Provided by University at Buffalo

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