



# CAN-198-Glowing coral reefs

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## Glowing coral reefs are striving to recover from bleaching, study says

By Ashley Strickland, CNN

As oceans warm due to climate change, some coral reefs have been devastated in recent years by bleaching events that cause them to die and damage the biodiversity that depends on them.



© Richard Vevers/The Ocean Agency/XL Catlin Seaview Survey Acropora corals experienced colorful bleaching in the New Caledonian barrier reef, located in New Caledonia in the South Pacific, in 2016.

Multiple studies are underway to understand more about these bleaching events and if corals can bounce back.

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While bleaching is associated with the stark white skeletal remains of corals after they have lost their live tissue, an opposite effect can also take place when such an event occurs.

It's known as colorful bleaching, where corals seem to amp up their pigments and provide brilliant displays of neon color.

Colorful bleaching has been observed since 2010 in coral reefs around the globe, but the mechanism and reasoning behind it hasn't been understood. Now, researchers believe the glowing corals are sending a message that they're trying to survive.

The study published Thursday in the journal [Current Biology](#).

Corals may seem like beautiful plants on the ocean floor, but they're actually animals. Many of them rely on symbiosis — a mutually beneficial coexistence where tiny algae live within the corals' cells. Coral branches are actually comprised of compact colonies that include thousands of tiny animals called polyps.

The corals get energy from photosynthesis provided by the algae, and the algae take shelter, nutrients and carbon dioxide from the corals. Those photosynthetic pigments provided by the algae cause many corals to appear brown.

But this arrangement is a fragile one that can be disrupted by rising ocean temperatures.

Oceans tend to reach a specific maximum temperature during hot seasons. But if the temperature rises just 1 degree Celsius above that threshold, it can spell disaster for corals.

The heat causes the coral and algae relationship to break down. After the algae disappears, the white limestone skeletons of the corals are exposed, making them appear bleached. If the corals can't retrieve their algae, the vulnerable corals starve and can be struck by disease. When the corals die, reefs collapse and decline, and so does the ocean biodiversity that depend on them.

Significant bleaching events occurred during record ocean temperatures between 2015 and 2017, causing the most widespread and devastating mass coral bleaching ever recorded, according to the study. Heat stress affected many coral reefs during the [El Niño event](#) between 2014 and 2017.

The Great Barrier Reef, Florida Keys and Fiji were just some of the reefs impacted worldwide.

However, at least 15 colorful bleaching events from across the world between 2010 and 2019, including one at the Great Barrier Reef in Australia, are included in the new study.

When corals turn colorful

Researchers wanted to investigate why these colorful events occur and their underlying causes. Controlled experiments were carried out at the University of Southampton's Coral Reef Laboratory, exposing common corals to different types of light and conditions.

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They discovered that the bright colors actually act as a protective layer similar to sunscreen when their algae are lost — and the colorful process actually acts like a blinking neon sign that encourages the algae to come back.

Colorful bleaching is how corals self-regulate, said Jörg Wiedenmann, lead study author and head of the University of Southampton's Coral Reef Laboratory. This creates what the researchers refer to as feedback loop for both partners in the relationship.

Algae soak up sunlight corals receive and create photosynthetic pigments. When the algae are gone, the corals have to deal with an excess of sunlight and their white skeletons reflect it, which cause further stress and can keep things from returning to normal.

"However, if the coral cells can still carry out at least some of their normal functions, despite the environmental stress that caused bleaching, the increased internal light levels will boost the production of colourful, photoprotective pigments," Wiedenmann said in a statement.

"The resulting sunscreen layer will subsequently promote the return of the [algae]. As the recovering algal population starts taking up the light for their photosynthesis again, the light levels inside the coral will drop and the coral cells will lower the production of the colourful pigments to their normal level."

During the lab experiments, the researchers were able to re-create the ocean temperatures that occurred during colorful bleaching events.

The cause of the colorful bleaching may lie in less extreme ocean-warming events that are brief and mild, the researchers determined based on their experiments. Or it could be a reaction to changes in nutrients the coral receive from their environment.

This provides some hope that corals and coral reefs can recover, especially given that some recent reports have suggested colorful bleaching in parts of the Great Barrier Reef during a [mass bleaching in March and April](#) of this year.

The researchers stressed, however, that improving regional water quality and a global reduction of greenhouse gases will contribute to the survival and sustained presence of coral reefs in Earth's oceans.

"Bleaching is not always a death sentence for corals, the coral animal can still be alive," said Cecilia D'Angelo, study coauthor and lecturer of molecular coral biology at University of Southampton, in a statement.

"If the stress event is mild enough, corals can re-establish the symbiosis with their algal partner," D'Angelo said. "Unfortunately, recent episodes of global bleaching caused by unusually warm water have resulted in high coral mortality, leaving the world's coral reefs struggling for survival."

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© Wledenmann D'Angelo Experiments were conducted at the coral reef aquarium facility at the University of Southampton Waterfront Campus.  
© Ryan Goehring/University of Washington Acropora corals experienced colorful bleaching in 2010 off the coast of the Philippines.



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*The only thing necessary for the triumph of evil is that good men do nothing”....Edmund Burke*

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