Internal control helps corals resist acidification

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Acropora yongei coral colony at Rottnest Island, Western Australia. Credit: Claire Ross, UWA

Scientists from the ARC Centre of Excellence for Coral Reef Studies (Coral CoE) at The University of Western Australia (UWA) have found that some corals are able to combat the effects of ocean acidification by controlling their own chemistry.

Coral reefs play an important role in protecting coastlines from damage caused by waves and storms, but also provide habitat and shelter for many marine organisms. However, major environmental challenges such as climate change, threaten the survival of coral reefs worldwide.

The world-first study is a breakthrough for marine science because the scientists have identified marine species that are resilient to ocean changes, which will help better understand how to protect coral reefs in the future.

Lead author Dr Thomas DeCarlo said rising carbon dioxide (CO2) levels in the atmosphere were reflected in the ocean, which leads to ocean acidification.

"Acidification hampers the ability of the coral to form skeletons and shells which are the building blocks of reefs," Dr DeCarlo said.

"In the past few decades, hundreds of experiments have shown that corals have a highly diverse response to ocean acidification depending on the species. However, the reasons why some are more tolerant than others are not clearly understood.

Dr DeCarlo and his team developed a new method to understand the internal chemistry of corals by using specialised equipment that measures the characteristics of the molecules in coral.

"The method showed corals with the most resistance are tolerant because of the way they are able to regulate their calcium levels," Dr DeCarlo

said. "This technique means scientists can identify species that are relatively resistant to ocean acidification."

"However, we are also looking at the costs associated with resisting acidification, which may potentially make acidification-resistant corals more vulnerable to other stressors."

Co-author Professor Malcolm McCulloch said previous studies found that even the more hardy coral species lose their ability to adapt to ocean acidification when they bleach under extreme heat events, as experienced in 2016.

"When a coral bleaches, it expels its 'powerhouse' - zooxanthellae symbionts, and loses the energy needed to keep its internal mechanisms running," he said. "The longer corals stay bleached, the less likely they are to recover."

More information: T. M. DeCarlo et al, Coral resistance to ocean acidification linked to increased calcium at the site of calcification, *Proceedings of the Royal Society B: Biological Sciences* (2018). DOI: 10.1098/rspb.2018.0564

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