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# Study: Some fish species can change faster to cope with ocean acidification

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By Responsible Seafood Advocate

## 'Some fish species may not be flexible when responding to elevated CO<sub>2</sub> conditions and struggle more'

Some fish species evolve faster to cope with future ocean acidification, according to new research from the University of Hong Kong. The research paper, which was published in *Global Change Biology* this month, sheds some light on the basis of variability across different fish species and that some species possess “evolved molecular toolkits to cope with future ocean acidification.”

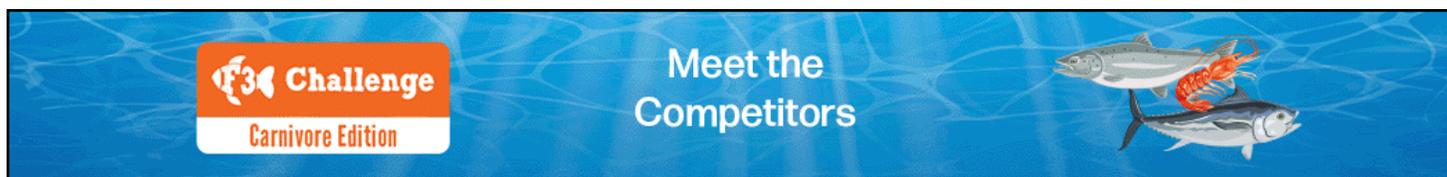
Global ocean surface pH is projected to decline because of the ongoing absorption of anthropogenic atmospheric carbon dioxide (CO<sub>2</sub>) by the ocean – a process known as ocean acidification. Research indicates that predicted ocean acidification conditions may affect some marine fishes' physiological performance, growth, survival and crucial behaviors for the survival of the fish.

“It has been quite puzzling why some species struggle more than others with ocean acidification conditions,” said Dr. Celia Schunter, study lead and co-author of the research paper. “Our expedition to this remote CO<sub>2</sub> vent site allowed us to look at many fish species that live naturally in these elevated CO<sub>2</sub> conditions and complete parts of the puzzle. We see that possibly limited by slow evolution, some fish species may not be flexible when responding to elevated CO<sub>2</sub> conditions and struggle more.”



"Species that evolve more rapidly may have a flexible way to cope with ocean acidification, which should be helpful for these species to maintain their population size and biodiversity." Photo courtesy of the University of Hong Kong.

To test how species might respond, the researchers measured brain transcriptomes of six coral reef fish species at a natural volcanic CO<sub>2</sub> seep and an adjacent control reef in Papua New Guinea. The scientists studied *in situ* exposure to elevated partial pressure of carbon dioxide (pCO<sub>2</sub>, the amount of carbon dioxide dissolved in water) and how wild fish cope with environmental conditions predicted to exist worldwide by the end of the century.



(<https://f3meeting.com/webinars/>).

"We show that elevated pCO<sub>2</sub> induced common molecular responses related to circadian rhythm and immune system but different magnitudes of molecular response across the six species," wrote the authors. "Notably, elevated transcriptional plasticity was associated with core circadian genes affecting

the regulation of intracellular pH and neural activity in *Acanthochromis polyacanthus*. Gene expression patterns were reversible in this species as evidenced upon reduction of CO<sub>2</sub> following a natural storm-event.”

Compared to other species, the scientists found that *A. polyacanthus* has a more rapid evolutionary rate and more positively selected genes in key functions under the influence of elevated CO<sub>2</sub>, thus fueling increased transcriptional plasticity.

“Species that evolve more rapidly may have a flexible way to cope with ocean acidification, which should be helpful for these species to maintain their population size and biodiversity,” said Schunter. “However, for some other species evolving more slowly, ocean acidification will be difficult for them once the pH level beyond their abilities to maintain their acid-base balance.

The next step is to validate if other ecosystems exhibit similar findings. Nonetheless, the researchers point out that ocean acidification remains a threat for the slow-to-evolve fish species once the level of ocean acidification rises beyond their regulation ability. In response, slowing down the decreasing global pH is critical to maintaining fish biodiversity.

Read the full study here (<https://onlinelibrary.wiley.com/doi/10.1111/gcb.16119>).

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