

Reef-building coral exhibiting 'disaster traits' akin to the last major extinction event

March 3 2020



The stony coral (*Oculina patagonica*) after being exposed to acidic ocean condition (pH 7.4) after two months and four months. This shows how some coral species are able to adapt to more acidic, extinction-like conditions by transforming from colonial communities (top) to solitary existence. Credit: Dan Tchernov

A study published Tuesday in *Scientific Reports* shows that stony corals, which provide food and shelter for almost a quarter of all ocean species, are preparing for a major extinction event.

The research team—which includes scientists from The Graduate Center, CUNY; Baruch College; Scripps Institution of Oceanography; University of Haifa; University of Leeds; and GEOMAR Helmholtz Centre for Ocean Research—found that corals are currently exhibiting a suite of dynamic survival responses that correspond with their last major extinction 66 million years ago. These coral traits include increased prevalence of deep-water residing, cosmopolitan distributions, non-symbiotic relationship to algae, solitary or small colonies, and bleaching resistance.

Scientists were able to trace these behaviors due to excellent [fossil records](#) that coral skeletons leave behind. This study compared those fossil records to the modern International Union for Conservation of Nature (IUCN) Red List data. The IUCN Red List of threatened species is world's most comprehensive information source on the global conservation status of animal, fungi, and plant species.

"It was incredibly spooky to witness how corals are now exhibiting the same traits as they did at the last major extinction event," said Professor

David Gruber, a researcher and marine biologist with The Graduate Center, CUNY and Baruch College. "Corals seem to be preparing to jump across an extinction boundary, while we are putting our foot further on the pedal."

The study highlights how primates do not possess survival characteristics or have a record of mass extinction survival as some corals do.

The researchers examined 250 million years of fossil coral data from the IUCN Red List and then compared similarities in the corals' recorded survival behaviors between the Cretaceous-Tertiary (KT) extinction event 66 million years ago (when the dinosaurs disappeared) and the current extinction event. Using the data, they were able to infer relevant traits, including an 18% decrease in coloniality, an 18% decrease in photosymbiosis, and a 12% decrease in the occupation of shallow habitats. Scientists also noted an evolutionary selection toward slower-growing coral, which may increase their chances of survival.

"This study reminds us that corals are diverse and flexible organisms with a demonstrated success facing the most extreme environmental crisis in Earth's history: mass extinction," said the study's first author Gal Dishon, a [marine biologist](#) with the Scripps Institution of Oceanography at the University of California. "Nevertheless, based on the lessons we learned from fossil data, the surviving corals will not be those reef builders we know from hyper-diverse tropical coral reefs, but rather small, solitary, slow-growing, and deep-dwelling corals."

The authors note that while slow recovery time (2-10 million years) of [coral](#) reefs following a mass extinction is distressing, they also call attention that primates (the order that also includes humans) are also increasingly becoming threatened with [extinction](#).

"There is something very powerful about this message coming from the

corals," said Gruber. "Corals are such a sensitive group of marine creatures, they are essentially the canary in the coal mine."

More information: Gal Dishon et al, Evolutionary Traits that Enable Scleractinian Corals to Survive Mass Extinction Events, *Scientific Reports* (2020). [DOI: 10.1038/s41598-020-60605-2](https://doi.org/10.1038/s41598-020-60605-2)

Provided by CUNY Advanced Science Research Center

Citation: Reef-building coral exhibiting 'disaster traits' akin to the last major extinction event (2020, March 3) retrieved 26 April 2024 from <https://phys.org/news/2020-03-reef-building-coral-disaster-traits-akin.html>

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