

Researchers Discover New Family Of Atlantic Corals In Groundbreaking Study

Analysis vital for planning conservation of threatened coral species

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An international research team led by scientists at Scripps Institution of Oceanography at the University of California, San Diego, and the Smithsonian Tropical Research Institute in Panama, has identified a family of corals found only in the Atlantic—a first for such classifications in that ocean—in a study that could transform the way corals are viewed and classified throughout the world.

Researchers from the United States, Brazil, Taiwan and Japan revealed significant flaws in the widely accepted taxonomy of Pacific and Atlantic corals. In the Feb. 26 issue of the journal *Nature*, a group led by Nancy Knowlton of Scripps Institution describes using DNA analysis techniques to uncover a significant, previously undetected divergence between Pacific and Atlantic corals.

Unexpectedly, the researchers found that about one-third of Atlantic corals, which had been conventionally classified in two distinct families found around the tropics, in fact are very closely related to each other but are very different from corals that were assumed to be their Pacific relatives. In fact, the researchers found the Atlantic corals are distinct enough to constitute their own family, the first such high-level grouping unique to the Atlantic. Several currently recognized Pacific "families" mostly likely don't deserve such a distinction and should be reclassified under other families, according to the authors.

The DNA results are contrary to accepted classifications based on the evolutionary form and structure, or "morphology," of corals. Calculating when this Atlantic lineage originated is difficult, since the results now call into question the identity of many fossilized corals. However the best records indicate that the dominant Atlantic and Pacific lineages probably separated more than 34 million years ago.

The *Nature* study's authors argue that the results carry implications beyond the upheaval and realignment of coral classification systems. They say the study is important for future decisions about coral conservation and the preservation of threatened biodiversity regions.

"Corals are important organisms because of the reefs they build, which support the most diverse marine ecosystems on the planet. But these new results are not simply that the coral taxonomy is completely wrong," said Knowlton, director of the Center for Marine Biodiversity and Conservation at Scripps. "These results require us to think about conservation priorities in a really different way."

Currently, conservation priorities have been heavily focused on the Pacific because more species are found there. However, so-called "biodiversity hotspot" analyses have ignored deeper-level diversity because the assumption has been that Atlantic corals are not particularly distinctive.

These new findings suggest that current conservation efforts need to be reconsidered because Atlantic corals threatened with extinction do not have close relatives to replace them. "Not only is the Atlantic group previously

unrecognized, it's also severely threatened," said Knowlton. "The Caribbean reefs, for example, have declined by about 80 percent over the last three decades." The study began as a straightforward attempt to determine the closest relatives of a few corals being studied by Knowlton and her colleagues. The first analysis immediately resulted in lineage classifications that went against conventional taxonomy and morphology. The researchers then extended their examination to more distantly related corals not only from the Caribbean but also from Brazil, Japan, Taiwan and Palau and found entire lineages misclassified.

"I think this is a classic example of how our understanding of the biodiversity that we are trying to conserve was fundamentally wrong," said Knowlton. "The results clearly indicate that basic science remains an essential part of conservation biology, and that priorities cannot be based on simply cataloging and analyzing what is 'known.'"

In addition to Knowlton, the paper's authors include Hironobu Fukami of Scripps Institution and the Smithsonian Tropical Research Institute in Panama; Ann Budd of the University of Iowa; Gustav Paulay of the University of Florida; Antonio Solé-Cava of the Federal University of Rio de Janeiro, Brazil; Chaolun Allen Chen of Academia Sinica of Taiwan; and Kenji Iwao of the Akajima Marine Science Laboratory of Japan. Funding for the study was provided by the National Science Foundation, the Smithsonian Institution, Scripps Institution of Oceanography and the Conselho Nacional de Pesquisas.

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