Coral colonies more genetically diverse than assumed

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Coral colonies are more genetically diverse than assumed. Credit: Maximilian Schweinsberg

Coral colonies are more genetically diverse than it has been assumed to date. This is the conclusion drawn by biologists at Ruhr-Universität Bochum, who have conducted comprehensive studies into the genetic variability in individual colonies of different reef-forming coral species. "However, this doesn't mean we should expect that this variability can compensate for corals dying worldwide due to climate change," says Maximilian Schweinsberg from the Department of Animal Ecology, Evolution and Biodiversity, headed by Prof Dr Ralph Tollrian.

In collaboration with colleagues, the researchers published their report in the journal *Molecular Ecology*.

Genetic diversity is the basis for adaptation to environmental change

"The ongoing climate change and the environmental change resulting thereof have an increasingly severe impact on coral reefs," explains Schweinsberg. The basis for adapting to the change is genetic diversity. Individual coral colonies can be comprised of millions of polyps. To date, it has been assumed that they originate through the proliferation of one larva and are therefore genetically identical. In isolated cases, however, the researchers found genetically different polyps inside a colony. But it was unclear how frequently this phenomenon occurred.

Two processes lead to genetic diversity in coral colonies

The genetic variability can be caused by two processes: by spontaneous genetic mutations in individual colony sections or by different corals coalescing during their development stage. In the first case, the resulting coral colonies are called mosaics, in the second case chimera. The biologists from Bochum have studied 222 coral colonies of five different species. In each species, they found genetically different polyps; the frequency of this phenomenon varied between 24 and 47 per cent. The majority of the genetically variable coral colonies were mosaics. However, chimera also occurred in all species.

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Well-adapted polyps feed the worse adapted ones

In stony corals, individual polyps release nutrients for the colony, presumably feeding the genetically less well adapted polyps. Thus, the colony's genetically "weaker" specimens can survive. If the environmental conditions change, for example due to climate change, new genetic patterns become necessary. Polyps that were poorly adapted to the old conditions may now gain an advantage. Accordingly, genetic diversity in colonies increases the probability of being equipped for different situations.

More information: "More than one genotype: how common is intracolonial genetic variability in scleractinian corals?", *Molecular Ecology*, DOI: 10.1111/mec.13200

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