

How soft corals defy their environment

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Many marine organisms, including corals, build skeletons from calcium carbonate -- in the form of calcite or aragonite. The current composition of seawater favors the formation of aragonite -- but soft corals have a specific protein that allows them to form calcite skeletons instead.

Calcium carbonate is a salt for all seasons. It turns up not only in marble, but also in biogenic sediments such as limestone and [coral reefs](#) – and even in pearls. The compound exists in two major crystalline forms, as calcite or aragonite. However, it is not clear what determines which variant an organism will exploit under conditions in which both forms can precipitate.

A team of researchers led by LMU geobiologist Dr. Azizur Rahman, who is also a Research Fellow of the Alexander von Humboldt Foundation, has now answered this question, in collaboration with colleagues based at the University of the Ryukyu Islands in Japan. Together, the scientists have shown that, in the soft coral species *Lobophytum crissum*, a secreted, extracellular protein known as ECMP-67 is the decisive factor that results in the precipitation of calcite, irrespective of the chemical conditions prevailing in the surrounding seawater.

"Over the course of Earth's history, and most probably depending on the relative amounts of dissolved magnesium and calcium ions, either calcite or aragonite has dominated in the world's oceans," says Professor Gert Wörheide, one of the authors of the new study. Current conditions favor the formation of aragonite, and many stony corals build their skeletons

exclusively from this material. However, thanks to ECMP-67, *Lobophytum crassum* can still produce calcite in an aragonite sea.

"We have also been able to show how the extracellular [protein](#) ECMP-67 contributes to the production of calcite at the molecular level," says Rahman. "These findings should also allow us to elucidate the crystal structure of [calcite](#) in natural environments." The study was funded by the Alexander von Humboldt Foundation and the Japanese Society for the Promotion of Sciences.

More information: Calcite formation in soft coral sclerites is determined by a single reactive extracellular protein, Azizur Rahman, Tamotsu Oomori and Gert Wörheide, *Journal of Biological Chemistry* 286: 31638-31649, 2. September 2011. [Doi 10.1074/jbc.M109.070185](https://doi.org/10.1074/jbc.M109.070185)

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