

Ph.D. position announcement – ***Uncovering the mechanisms of coral-symbiont dynamics and symbiont change (SYMCHANGE)***

The Marine Ecology Group at University of Bremen has a vacancy for a Ph.D. student to **start in March 2025** within the framework of the new project ***Coral acclimation to global warming: Uncovering the mechanisms of coral-symbiont dynamics and symbiont change (SYMCHANGE)*** funded by the German Research Foundation (DFG).

This project will be implemented in partnership between Marine Ecology Group at University of Bremen and Systems Ecology Group at ZMT Bremen. Each of the two groups has a PhD position to offer. Both PhD students will closely work together and will be supervised by the two partner groups. Here, we only announce the PhD position in Marine Ecology Group. The other announcement will follow.

**Project description:**

Hard corals form the foundation of coral reefs. Their success is the result of an endosymbiotic association with photoautotrophic algae (called symbiont hereafter). High water temperatures induce corals to expel their symbionts, a phenomenon called bleaching, the most prominent threat to corals. Since some symbionts are more thermally tolerant than others, symbiont change (i.e., a shift of the symbiont community within corals) may act as acclimation mechanism of the coral-algae complex under global warming. Major limitations to this hypothesis are trade-offs between increased thermal tolerance at the expense of a reduction in key physiological functions of corals, such as growth and calcification. In addition, the physiological mechanisms underpinning symbiont change and the related ability of corals to adapt to thermal stress are poorly understood. Here we propose to integrate experimental ecology, ecophysiology, geochemistry, and mathematical modelling to identify mechanisms and environmental conditions that drive symbiont change and to assess the effects on coral functions. For this purpose, we will add the heat-resistant symbiont *Durusdinium trenchii* to the two widespread hard corals *Stylophora pistillata* and *Montipora digitata* with and without a prior stress-induced reduction in symbionts (i.e., bleaching) to test whether stress is an essential trigger to initiate symbiont change in controlled laboratory experiments. Control treatments without the addition of *D. trenchii* may reveal if symbionts are acquired from the environment (i.e., externally) or if an internal shuffling of symbionts already present within the coral-algae complex occurs. During these experiments, we will further investigate changes in symbiont population and composition along with biogeochemical coral functions (e.g. growth, photosynthesis, calcification, skeleton formation) using eco-physiological, biogeochemical, and molecular tools. Mathematical modelling, conducted by our project partners, will integrate the relevant information gained from the laboratory experiments into a broader and more flexible simulative context. Numerical experiments will allow us to explore different coral acclimation hypotheses related to symbiont change and their effects in the context of varying environmental conditions. The combination of laboratory experiments with mathematical modelling is a promising approach to uncover the processes driving the relationship between corals and different symbionts, the mechanisms at the base of the changing symbiont populations, along with the costs and benefits associated with such changes. Our project will thereby shed new light on the capacity of corals to respond to environmental perturbations and will contribute to the development of innovative strategies to support the functioning of coral reefs under the influence of ocean warming.

The successful candidate will be supervised by Prof. Dr. Christian Wild and Dr. Benjamin Müller at University of Bremen in partnership with Prof. Dr. Agostino Merico and Dr. Subhendu Chakraborty from ZMT. **The appointment is for a three-year period. Salary will be according to the German TV-L 13 for a 65 % position.**

**Requirements:**

Applicants should hold a Master degree in marine biology, microbial ecology, biogeochemistry, ecophysiology, or related fields before the intended starting date. They should speak fluent English and possess good scientific writing and time management skills. Expertise in ecophysiological, biogeochemical, and molecular tools as well as coral husbandry and experience in conducting aquarium experiments are further assets.

**Application:**

To apply, please send a short motivation letter (max. 1 A4) and a complete CV with list of publications and skills along with names of three referees (with email addresses and phone numbers) in a single pdf-file to christian.wild@uni-bremen.de. Only short-listed candidates will be notified.

**Closing Date:**

November 30, 2024 or until a qualified candidate is identified.