MODELLING THE RESPONSES OF MARINE ORGANISMS TO CHANGING CLIMATE CONDITIONS

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BACKGROUND

All

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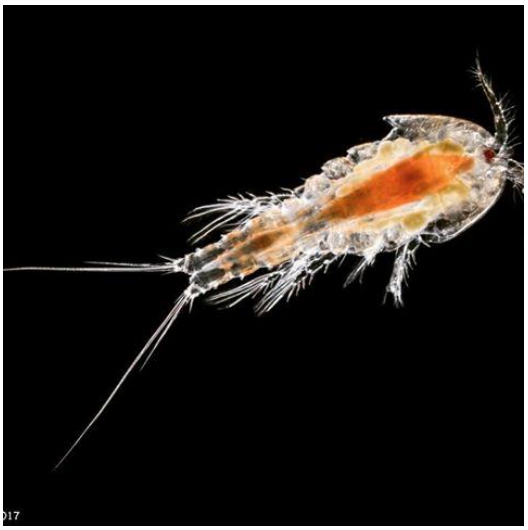
Background

Since the current period of climate warming began in the 1980s, the increasing emission of greenhouse gases such as CO_2 has raised global sea surface temperatures as well as significantly altered sea water chemistry and pH. Coastal ecosystems are believed to be especially vulnerable to these effects since their resilience has already been undermined by increased pollution, eutrophication, over-exploitation and habitat destruction.



To understand the resilience of coastal ecosystems to climate change, we first require insight into the responses of marine biota traits to the combined effects of ocean warming and acidification. The likelihood of adaptation to climate change related stressors also needs to be assessed in order to predict future population persistence. Phenotypic plasticity (acclimation) may facilitate the persistence of populations in the short term but adaptive evolution (genetic change as a consequence of natural selection) will likely be required to persist in the long term.

Scope of the thesis

Experiments to study the community interactions, phenotypic plasticity, and adaptive evolution of several marine species, under changing environmental conditions, are ongoing with colleagues from the Marine Biology Research Group and the Phycology Lab, Department of Biology. Depending on the interest of the student, this thesis offers the possibility to focus entirely on developing models of these marine populations, or to also participate in the experimental work.

The student will develop and analyze a model of the population dynamics that accounts for species-specific phenotypic variability, acclimation and adaptation. The experimental data will feed into the models, so that they may be used to conduct scenario analyses of population persistence under different future climate conditions.