

Press Release

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Global warming's impact may be detected in genes

– Marine researchers from Kiel and Muenster publish study on the reaction of seagrasses to heat waves –

15.11.2011/Kiel. Climate change imposes stress on organisms. The global change is characterized by both the change in mean variables and the increase in extreme events and both are affecting organisms. What impact extreme events such as heat waves have on seagrasses is the focus of a research programme done by scientists from the Kiel University, the University of Münster and the Leibniz-Institute of Marine Science (IFM-GEOMAR). The results of the study are now published online in the renowned international research journal „Proceedings of the National Academy of Sciences“(PNAS).

Seagrass populations thrive in the shallow coastal regions and offer an ideal habitat for many fish, crustacean and microbes. The worldwide decline of seagrass populations in recent years is therefore of major concern to science and to nature conservation. Researchers believe that climate change plays an important role as the increase in extreme events such as heat waves is a major challenge for the seagrass. How exactly the seagrass species are impacted by extreme events is examined by scientists from the Kiel University, the University of Münster and the Leibniz Institute of Marine Sciences (IFM-GEOMAR) in a study recently published in the renowned research journal „Proceeding of the National Academy of Sciences“(PNAS).

The scientists around Professor Dr. Thorsten Reusch from the IFM-GEOMAR are tackling the questions if heat waves have an effect on the genetic of the widespread seagrass species *Zostera marina* (eelgrass). “In the Mediterranean grasses can resist higher temperatures than in Northern Europe. Here the sea grass populations are endangered by the occurrence of heat waves with temperatures over 25 degrees in the summer”, Reusch explains the background of the research project. The adaptability to heat seems to have a genetic basis which is the main interest of the scientists involved in the project. For the analysis the PhD candidates Susanne Franssen and Nina Bergmann collected sea grasses from different locations in Northern and Southern Europe and exposed them to controlled heat waves in a special test site, the AQUATRON, in the laboratory. Afterwards the scientists analysed the activity of almost all genes of the plants.

Regardless of their origin, plants showed activation of genes known to buffer heat stress. Only after the heat wave, the southern European plants proved to be resilient, going back to their normal gene activity immediately after the heat wave. The northern European plants, however, showed signs of irreversible protein damage. Apparently, the critical process whether or not a plant continues to grow or eventually dies occurs during the recovery period after the acute heat wave. To predict the adaptability of organisms to extreme events, such as heat waves, the examination of gene expression during the recovery period seems to be the better parameter. “These results raise further questions. For example, we are now particularly interested in the ability of particular genotypes within the northern populations to also have the ability to regulate their gene activity back to the normal levels. If this was true our populations in the North and the Baltic Sea would be able to adapt to climate change”, says Reusch.

The Leibniz Institute of Marine Sciences is member of the

Original Publication:

Franssen, S.U., J. Gu, N. Bergmann, G. Winters, U.C. Klostermeier, P. Rosenstiel, E. Bornberg-Bauer, and T.B.H. Reusch, 2011: Transcriptomic resilience to global warming in the seagrass *Zostera marina*, a marine foundation species. *Proceedings of the National Academy of Sciences*, Early Edition, <http://dx.doi.org/10.1073/pnas.1107680108>

Links:

<http://ieb.uni-muenster.de/> Institute for Evolution and Biodiversity of the University of Münster
<http://www.ikmb.uni-kiel.de/cms/> Institute for clinical molecular biology of the Kiel University
<http://www.ifm-geomar.de/565> Research Unit "Evolutionary Ecology of Marine Fishes" at the IFM-GEOMAR

Figures:

At www.ifm-geomar.de/presse images are available for download.

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