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TITLE: New perspectives in ocean acidification research: editor's introduction to the special feature on ocean acidification

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ABSTRACT:

Ocean acidification, caused by the uptake of additional carbon dioxide (CO 2) from the atmosphere, will have far-reaching impacts on marine ecosystems (Gattuso & Hansson 2011 Ocean acidification . Oxford University Press). The predicted changes in ocean chemistry will affect whole biological communities and will occur within the context of global warming and other anthropogenic stressors; yet much of the biological research conducted to date has tested the short-term responses of single species to ocean acidification conditions alone. While an important starting point, these studies may have limited predictive power because they do not account for possible interactive effects of multiple climate change drivers or for ecological interactions with other species. Furthermore, few studies have considered variation in responses among populations or the evolutionary potential within populations. Therefore, our knowledge about the potential for marine organisms to adapt to ocean acidification is extremely limited. In 2015, two of the pioneers in the field, Ulf Riebesell and Jean-Pierre Gattuso, noted that to move forward as a field of study, future research needed to address critical knowledge gaps in three major areas: (i) multiple environmental drivers, (ii) ecological interactions and (iii) acclimation and adaptation (Riebesell and Gattuso 2015 Nat. Clim. Change 5 , 12?14 (doi:10.1038/nclimate2456)). In May 2016, more than 350 researchers, students and stakeholders met at the 4th International Symposium on the Ocean in a High-CO 2 World in Hobart, Tasmania, to discuss the latest advances in understanding ocean acidification and its biological consequences. Many of the papers presented at the symposium reflected this shift in focus from short-term, single species and single stressor experiments towards multi-stressor and multispecies experiments that address knowledge gaps about the ecological impacts of ocean acidification on marine communities. The nine papers in this Special Feature are from authors who attended the symposium and address cutting-edge questions and emerging topics in ocean acidification research, across the taxonomic spectrum from plankton to top predators. They cover the three streams of research identified as crucial to understanding the biological impacts of ocean acidification: (i) the relationship with other environmental drivers, (ii) the effects on ecological process and species interactions, and (iii) the role that individual variation, phenotypic plasticity and adaptation will have in shaping the impacts of ocean acidification and warming on marine ecosystems.

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