Calcification in changing oceans explored in special issue of The Biological Bulletin

July 23 2014, by Gina Hebert

This is branching coral *Acropora sp.* Credit: Maria Byrne, University of Sydney

What do mollusks, starfish, and corals have in common? Aside from their shared marine habitat, they are all calcifiers—organisms that use calcium from their environment to create hard carbonate skeletons and shells for stability and protection.

The July issue of *The Biological Bulletin*, published by the Marine Biological Laboratory, addresses the challenges faced by these species as ocean composition changes worldwide.

As atmospheric carbon dioxide rises, the world's oceans are becoming warmer and more acidic. This impact of global climate change threatens the survival of calcifying species because of the reduced saturation of the carbonate minerals required for calcification.

The ability to calcify arose independently in many species during the Cambrian era, when calcium levels in seawater increased. This use of calcium carbonate promoted biodiversity, including the vast array of calcifiers seen today.

"Today, modern calcifiers face a new and rapidly escalating crisis caused by warming and acidification of the oceans with a reduction in availability of carbonate minerals, a change driven by the increase in atmospheric CO2 due to anthropogenic emissions and industrialization. The CO2 itself can also directly cause metabolic stress," write the issue's co-editors, Maria Byrne of the University of Sydney; and Gretchen Hofmann of the University of California-Santa Barbara.

Contributors to the journal address this timely issue across many taxa and from a variety of perspectives, from genomic to ecosystem-wide.

This is bryozoan *Iodictyum yaldwyni*. Credit: Abigail M. Smith, University of Otago

Other researchers address lesser-known organisms that are nevertheless critical to marine ecosystems. Abigail Smith of the University of Otago examines how bryozoans, a group of aquatic invertebrate filter-feeders, increase biodiversity by creating niche habitats, and what features make them particularly sensitive to calcium fluctuations.

Evans and Watson-Wynn (California State University-East Bay) take a molecular approach in a meta-analysis showing that ocean acidification is effecting genetic changes in sea urchin larvae. Several papers take a broader population-based view by studying the effect of ocean acidification on predator-prey interactions in mollusks (Kroeker and colleagues of the University of California-Davis) and oysters (Wright

and colleagues of the University of Western Sydney).

"The contributors have identified key knowledge gaps in the fast evolving field of marine global change biology and have provided many important insights," the co-editors write.

By sharing research on this topic from researchers around the world, *The Biological Bulletin* is raising awareness of some of the greatest threats to the oceans today and emphasizing the global nature of the problem.

Provided by Marine Biological Laboratory