Influence of reduced pH on growth and development of the marine gastropod *Crepidula fornicata*

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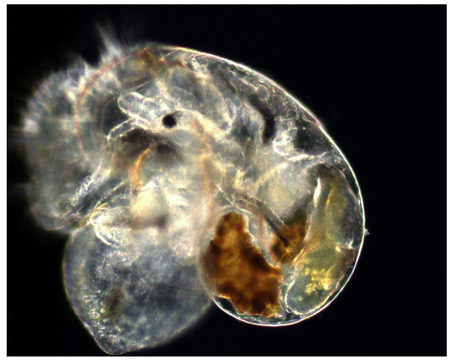
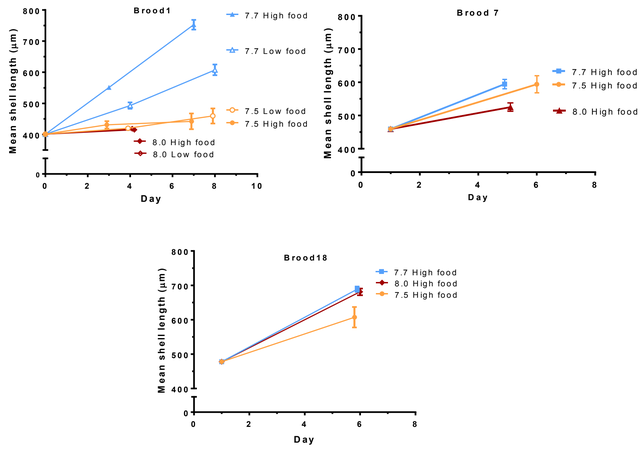
The Issue: Massive amounts of human-produced CO_2 have been absorbed by the world's oceans since the start of the Industrial Revolution some 250 years ago, changing ocean chemistry and reducing pH substantially. Here we show the results of several pilot studies looking at the potential impact of such shifts.

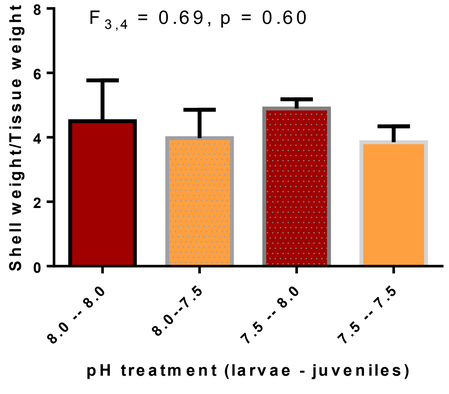


1. Growth: Larvae grew more slowly at pH 7.5 than at pH 7.7



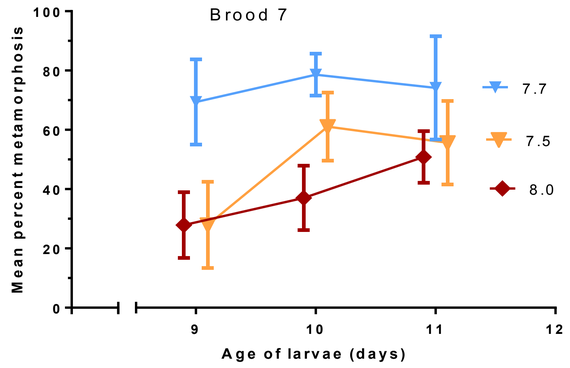
Four replicates, with 20 larvae per replicate.

2. Growth: pH did not alter relative rates of shell and tissue growth for juveniles.



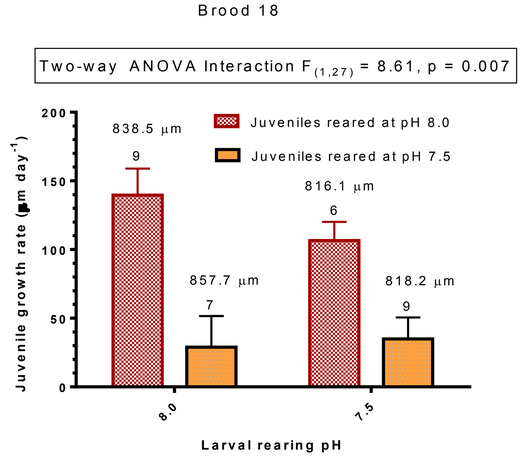
Larvae were reared at the indicated pH, triggered to metamorphose, and raised as juveniles for 8 days.

3. Competence: Larvae took longer to become competent to metamorphose at pH 7.5 than at pH 7.7



Four replicates, with 20 larvae per replicate.

4. Carryover Effects: Larvae that had been reared at pH 7.5 grew more slowly as juveniles at pH 8 than control individuals did.



5. Coming soon: The genetic basis for sensitivity differences to low pH

In some of our studies, about 10% of larvae grew normally and quickly at pH 7.5, while most showed abnormally slow growth. What is the genetic basis for such individual differences in tolerance? To determine this we are currently sequencing the transcriptomes of the larvae that grew well at pH 7.5 and those that did not grow well at this stressful pH. Did the individuals that grew well simply have different alleles of certain genes that confer better growth under acidified conditions? Or were those larvae expressing genes that stimulate faster growth or protect the larvae from acidified environments at higher levels than those larvae that did not grow as well under the same conditions? We expect to have answers to these questions within the next few weeks.

Acknowledgements: this research is supported by NSF Ocean Acidification grants 1416846 to Jan A. Pechenik and 1416690 to Anthony Pires. We thank Christine Choi and Tess Dooley for careful laboratory assistance, Taylor Shellfish Company for access to adults at Totten Inlet, and the staff at Friday Harbor Laboratories for maintaining the ocean acidification system.