Effects of temperature and pH on skeletal growth and thickness in the green sea urchin *Stronglyocentrotus droebachiensis*

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This summer I did research in conjunction with Professor Amy Johnson and Sara Davenport (class of 2013) to further analysis on projects begun by Alex Brasili (class of 2010) and Roger Brothers (class of 2011). Their research projects had investigated the effects of changing pH and temperature on marine calcifiers, in particular the green sea urchin, *Stronglyocentrotus droebachiensis*. The analysis had not been totally completed for either of the experiments, so Sara and I began the summer by examining the two projects in order to determine what still needed to be done in order to reap the maximum benefits of the studies. We determined that all the skeletons from both the Brasili 2010 and Brothers 2011 experiments needed to be dried and weighed in order to determine the percentage of body weight that was allocated as skeletal mass. It was this process that occupied us for the majority of our 10 weeks of research.

For each urchin, we set it in a cup of bleach for 2 days to remove living tissue, and then rinsed away the bleach and put the remaining skeletal material into a drying oven for 24 hours. Upon removing the skeletons from the oven, we would get a dry weight, and we would then separate each urchin into three components: skeleton, jaws, and spines. We would weigh each of these groups in order to determine if the organisms were using a higher percentage of their calcification on a particular component of their skeletons. After this process was completed, we would finish up the analysis by measuring the thickness of each urchin’s skeleton at the top, middle, and bottom. The data we collected were analyzed for trends linking temperature or pH to percent of body weight allocated to skeleton or skeletal thickness. Our preliminary results suggested that temperature did not have a significant effect on skeletal allocation, but we predict that further analysis of the results will show that changing pH did affect the urchin’s ability to calcify.

While we did make significant progress on this project during the summer, there is still a lot of work that remains to be completed. The urchins from Brothers 2011 still need to be bleached, dried, separated and measured, as well as examined for a tetracycline mark which was embedded in the skeleton during the experiment in order to measure growth. Additionally, we hope to work with the chemistry department in order to use an ICP to determine ratios of Mg/Ca in the urchin skeletons. Development of a sound method to determine this ratio is an important step in taking understanding of the effects of ocean acidification on marine calcifiers to the next level.

I enjoyed my research this summer and look forward to continuing it during the academic year as Honors research. It was a great experience working together with other researchers, undergraduates and professors alike, and has certainly broadened my appreciation for those working in research fields.

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