Artemia salina Survivability in Lowered pH Conditions

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Background

Our research centered around the long-term ecological effects of ocean acidification in the Atlantic Ocean. As carbon dioxide is absorbed into the ocean, the pH in the Atlantic has become more acidic, falling from 8.2 to 8.1 over the past century. This 0.1 pH decrease represents almost a 30% increase in the acidity of ocean water, and carbon emission trends suggest that the pH will continue to drop even more drastically.

Experimental Design

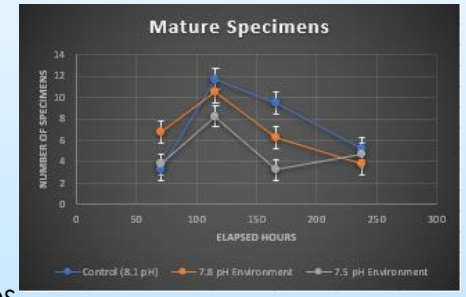
- Three treatment pH's at 8.1, 7.8, and 7.5 pH
- Treatments created using precise concentrations of salt water, hydrochloric acid, bicarbonate, and sodium carbonate
- Added 50 mg±5 mg capsulated eggs per treatment
- 5 mL of solution taken at 4 time [intervals
- Stored in iodine solution until data analysis
- Counts done from 3 random transects of slide

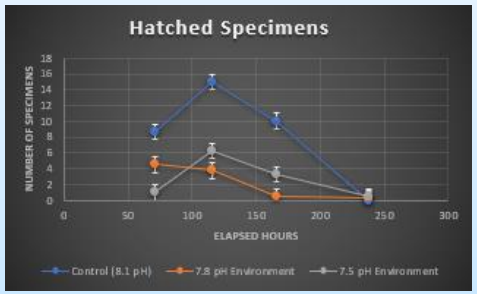
Central Questions and Hypothesis

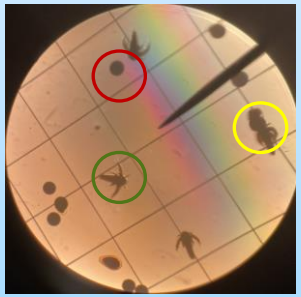
- How could lowered pH conditions in ocean waters affect survivability of sensitive organisms like *Artemia salina*?
- We hypothesized that lowered pH will severely decrease the hatching success of marine organisms like *Artemia salina,* and will produce lower densities of mature specimens.

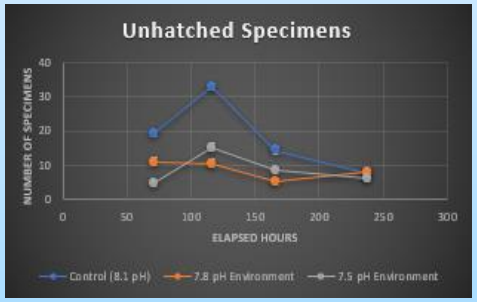
Results and Analysis

- Data collection from three trials of every treatment at each time point produced 108 data points
- Specimens classified as "mature", "hatched", or "unhatched" based on their appearance under a microscope
- Averages of each category taken from three trials and graphed for Count vs. Elapsed Time (in hours)
- Profound differences in hatching and maturing rates shown between treatments after 116 and 166 hours
- Bottleneck effect observed after 238 hours, where samples provided less data overall, and treatments were less diverse
- Greater number of deformities observed in specimens between 166 and 238 hours
- Very few nauplii observed in acidic treatments after 166 hours and almost no nauplii in any treatments after 238 hours









Implications

- Our findings show that low pH levels negatively affect *Artemia salina* survivability.
- Die-offs of marine organisms in the base of food chain due to the change in pH could be catastrophic for larger marine animals and the fishing industry.
- These findings should be used as an awareness of the dangers of ocean acidification.

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