The Effect of Water Temperature on the Mussel's Byssal Thread Protein Composition

Polen, Amy

Mytlius edulis, more commonly known as the blue mussel, is located in a wide area of locations that have colder water temperatures, such as the New England area. To determine if climate change would drastically affect the mussel's attachment strength, previous research has been conducted that showed that the mussel's byssal threads have a stronger tenacity in colder water temperatures compared to a warmer water environment. In this year's work, the byssal threads were tested for a difference in protein composition that accounts for this variance in tenacity. A procedure similar to the one used last year was employed, where the mussels were kept in two separate temperature conditions and the tenacity was measured. The byssal threads collected during this process were then run through a protein electrophoresis process, and the bands of protein were determined using MALDI mass spectrometry to determine the exact proteins present in the threads. The results from last year's experiments were replicated (that the colder water temperature caused a higher tenacity), and were proven statistically significant. Preliminary results regarding protein composition have been gathered and are being processed through different programs to guarantee accuracy. The project has many varying applications, from underwater adhesives to practical medical usage and damage control caused by invasive species of marine bivalves such as the zebra mussel. Further research is being performed on the effectiveness of enzymes at preventing adhesion of mussels onto underwater infrastructure.

Awards Won: