The mechanism that barnacle cyprids use to attach onto surfaces (Gohad et al. 2014; Aldred et. al. 2013) and the process that oysters use for shell mineralization are currently being studied. (Mount et. al. 2004) Previous research has used confocal microscopy and computer software to determine the respective components and mechanisms of each organism, however these results have been limited because they do not allow enough data analysis. This project used the same confocal data and Imaris software to improve upon the previous 3-D visualizations of these areas by enhancing the different structures to allow for more insightful data analysis. Researchers have been able to use the visualizations to discover key information about the location and production of chitin, a polysaccharide polymer found in insect exoskeletons, thought to be a major component of barnacle adhesive; and have been able to analyze the presence of matrix metalloproteinases (MMPs), an enzyme related to wound reparation, theorized to be involved in shell mineralization in oysters. The use of improved visualization tools, such as Imaris, will be a significant factor in future study methodologies related to these research areas, as well as other studies involving confocal data analysis.

Methods

Raw confocal data acquired. Input into Imaris software and irrelevant data channels filtered out.

Specific areas of interest represented with structures to highlight their distinctive features by using Imaris tools such as “surfaces” and “spots”.

Movie clips demonstrating the different visualization techniques generated. Data refined as advised by research mentors.

Results and Discussion

The advanced visualization of barnacle and oyster data resulted in the use of Imaris for confocal microscopy data sets. It has been useful in highlighting specific features of the data for analysis that is otherwise indistinguishable. The use of this visualization technique will allow for more insightful data analysis on future projects in Dr. Mount’s group with similar data types.

References