Undergraduate Internship Project #5 of 11 for FY14

Intern Amelia Harrison’s project, sponsored by the DWRC, was titled “Fine-scale Temporal Dynamics of Estuarine Virioplankton Populations.” She was advised by Dr. K. Eric Wommack of the UD’s Department of Plant and Soil Sciences.

Abstract

Viral communities play a large role in influencing marine ecosystem dynamics mostly through the infection of bacterial hosts. Most studies on the population turnover time of aquatic viruses have been conducted over longer periods of time (months and seasons). This study, however, examines population dynamics over a much shorter time course (twenty-four hours), a scale more typical of viral infections. Water was collected from the Delaware Bay and incubated at ambient temperature. Subsamples were taken at six-hour intervals for twenty-four hours. Viruses were recovered by means of FeCl₃ flocculation. Viral concentrates were then purified. The marker genes g23 major capsid protein (gp23) and ribonucleotide reductase (RNR) genes (Cyano 1, Cyano 2, and RTPR) were amplified. Adapter ligation and PacBio sequencing followed. Data analysis revealed that the Cyano 1 RNR marker gene produced sequences that were fewer and of poorer quality comparatively. The clusters that displayed the most change over the twenty-four hours were those that were the most abundant, while the less abundant clusters tended to remain more stable. The gp23 sequences showed more diversity over time than the RNR sequences. From these results we can conclude that the Cyano 1 gene marker is either flawed or simply ineffective. It seems that the gp23 marker gene may be the most revealing marker gene. It can also be assumed that the more abundant virus groups are the most dynamic. Future work will include gene amplification and sequencing of viral concentrates from the other replicates.