CONSIDER FOR TALK

10th Annual SEA Symposium Abstract

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Exploring a SEA of Phages: Insights into Host-Phage Interactions

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Lehigh’s SEA-PHAGES program continues as a collaborative research enterprise for first year and advanced undergraduates who focus on isolating and characterizing Actinobacter phages to gain a better understanding of phage genome structure, gene function, and phage biology in general. Of special interest to our group are mycobacteriophages from Cluster N – a group of temperate phages characterized by relatively small genomes of average size 43,111bp and a highly variable region centrally positioned within the genome. Recently, a novel mechanism of prophage-mediated immunity was uncovered for Cluster N lysogens that provides defense against attack by variable groups of heterotypic mycobacteriophages and appears dependent on genes in the variable region of Cluster N genomes (Dedrick *et al*., 2017). We report on progress on several projects. **I**. In addition to uncovering 16 new phages infecting *Mycobacterium smegmatis* including two new Cluster N phages, Parmesanjohn and Spongebob, our 9th year cohort of students focused on testing infectivity of newly isolated phages on Cluster N Xeno lysogen lawns, and discovered three Cluster A11 phages with reduced infectivity compared to infectivity on *M. smegmatis* lawns. Isolation of defense escape mutants is currently in progress. **II**. An estimate of cluster diversity was obtained from DOGEMS analysis and annotation of two Cluster N phages (Spongebob Parmesanjohn) and 3 Cluster A11 phages (Munch, Bowtie and Bud). **III**. We used RNAseq to explore changes in host gene expression following early and late lytic infection (by a Cluster N phage). Additionally, we examined transcription patterns in a Cluster N lysogen and a putative Cluster W lysogen. Preliminary data show patterns of *M. smegmatis* gene expression vary depending on phage type. Collectively, these experiments provide further insights into *M. smegmatis* host-phage interactions affecting host defense against viral attack and host gene expression.