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11th Annual SEA Symposium Abstract

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Flint Hills Phages - Characterization of Microbacterium foliorum cluster EB & Gordonia terrae clusters CZ, CV, and subcluster CY1 bacteriophages

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For three years, Kansas State University has been isolating mycobacteriophages from enriched soil samples in Mycobacterium smegmatis. This year’s project expanded our host range to include *Microbacterium foliorum* NRRL B-24224 SEA and *Gordonia terrae* CAG3. Our first semester yielded a 100% isolation rate, with 22 students isolating two *M. foliorum* and 20 *G. terrae* phages. Of the four genomes sequenced and annotated, one was a *M. foliorum* phage and three were *G. terrae* phages. BubbaBear, an EB cluster *M. foliorum* phage, is a small (69 genes), lytic phage that replicates with a particularly large plaque morphology. Included in its relatively small genome are 5 genes associated with thymidine metabolism, including thymidylate kinase, thymidylate synthase, dUTP pyrophosphatase, dihydrofolate reductase and thioredoxin. Four of the five genes in this pathway are found in all 18 EB cluster members, while the 5th gene, dUTP pyrophosphatase, is found in 17 of the 18 members. EnalisNailo is an average-sized temperate CY1 subcluster *G. terrae* phage. It has 66 genes, including two putative Y-integrase genes adjacent to each other in the genome. Five other of the eight CY1 subcluster phages also have this double, adjacent Y-integrase gene arrangement. Temperate phages customarily have a single integrase gene to establish lysogeny, so the conserved presence of two complete integrase genes adjacent to each other, but in separate pham groups in the CY1 subcluster, is of interest. Faith5x5 is a temperate *G. terrae* phage in the CZ cluster, but does not classify further into any of the seven known subclusters. This cluster and its subcluster are sparsely populated with mostly draft genomes. The CZ cluster, subclusters excluded, has only two members and the members are very divergent in gene content on both arms of the genome. Unlike some members of the cluster, Faith5x5 has a single holin A gene instead of a 2-gene holin A coding arrangement seen in other CZ cluster genomes. Wocket is a CV cluster temperate *G. terrae* phage with 79 genes. Included in the genome are two lysin A genes corresponding to the amidase and C39 peptidase domains. While proven to be temperate by lysogeny assays, excise was not able to be identified in the genome, while S-integrase, immunity repressor, and a CRO/HTH DNA binding domain were putatively identified by sequence analyses.