DO NOT CONSIDER FOR TALK

10th Annual SEA Symposium Abstract

Durham Technical Community College

Durham NC

Corresponding Faculty Member: Marie Fogarty (fogartym@durhamtech.edu)



Betiel M Amanuel



Timothy F Hall Jr.

All the Phuss about Gordonia Phages: Exploration of Three Novel Gordonia terrae Bacteriophages: Horus, Octobien14 and IDyn

Betiel M Amanuel, Timothy F Hall Jr., Charles J Anspach, Rebekah J Chiquito, Jailyn M Gales, Khadijah Hotaki, Brenda Lozano, Peter Said, Steven A Leadon, Marie P Fogarty

Bacteriophages are viruses that infect bacteria and in most cases cause lysis by disrupting host metabolism. This year Durham Tech collected three bacteriophages capable of infecting *Gordonia terrae* 3612 - Octobien14, IDyn and Horus. Octobien14, a singleton, was found by direct isolation and contains 132 genes. Horus is assigned to subcluster DN1 and contains 105 genes and IDyn is a member of subcluster CR4 and contains 89 genes. Horus and IDyn were both found by enrichment isolation. Genome annotations were carried out using DNA Master and PECAAN. Following genome annotation, some additional biological and bioinformatics experiments were carried out. In an effort to improve bacteriophage DNA yields for future semesters, we compared DNA yield from phenol:chloroform extraction with the Promega Wizard® Clean-Up Kit method. Phenol-chloroform extraction yielded a three-fold higher DNA concentration and improved purity and integrity. Phage survival following dehydration in the absence of host bacteria for up to three weeks indicated that plaque formation for IDyn dropped 106-fold, while Octobien14 was reduced 102-fold suggesting that Octobien14 is more resilient under these conditions. The presence of the integrase gene in Octobien14 and Horus prompted us to test ability of these phages to form lysogens and to search for the integration sites (attP sites) in their genomes. Results from patch assays and liquid phage release assays suggest that Horus and Octobien14 are capable of creating stable lysogens. Initial sensitivity assays demonstrated that Octobien14 and Horus are unable to infect their own respective lysogens. Regions of homology between phage and host were identified for Octobien14 at 60989-61699 bp and between 32484-32536 bp in Horus. For Horus, this region is adjacent to the integrase gene and shows homology with a region in between (but not within) two tRNAs in the host genome. tRNA enumeration revealed that Octobien14 had six, Horus had one, and IDyn had no annotated tRNAs. Bioinformatics analysis included investigation of possible promoters and terminators, and identification of transmembrane proteins. Using the program SOSUI, we predicted that IDyn had nine transmembrane proteins, two with assigned functions of Holin and Tape Measure and five with unknown function. Seventeen transmembrane proteins were identified for Horus, with three having assigned functions of Holin, Tape Measure, and Membrane Protein Band-7 Like, and the remaining fourteen lacking an annotated function. The transmembrane helices for these proteins were confirmed using TMHMM (through PECAAN). Indication of transmembrane proteins provides some functional insight for genes with unknown function. The exploration of phages Horus, Octobien14, and IDyn increases our knowledge about *Gordonia terrae* bacteriophages and their host, which may ultimately be useful in a multitude of applications such as phage therapy and genetic engineering.