CONSIDER FOR TALK

9th Annual SEA-PHAGES Symposium Abstract

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When can a phage make a "nucleus"? Student driven discovery of Phabio and Noxifer.

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Pseudomonas is a lineage of bacteria that includes the aetiological agent responsible for cystic fibrosis and a number of beneficial plant associated microbes. One of the latter, Pseudomonas fluorescens SBW25 is also commonly used to study rapid niche adaptation in experimental evolution. We used P. fluorescens SBW25 as our target organism for our first phage hunt in New Zealand in 2013. We discovered and sequenced two new Myoviridae phages, classified as Jumbophages (genomes >200 kb) Noxifer and Phabio. Genome sequencing revealed that our Jumbophages have a number of interesting genetic information processing ¬homologs including T4-like DNA polymerase, DNA ligase, RNA polymerase subunits and DnaB helicase. Phamerator analysis reveals that these homologs are common in the Pseudomonas Jumbophages and that long term synteny in the midst of nucleotide divergence appears to be the norm in this group.

Noxifer and Phabio have not been found to infect other strains of Pseudomonas species tested (n=5) and are likely to have a limited host range. Each has a relatively small burst size, on the order of ~20 phages are produced in a round of infection. In addition, both of these Jumbophages are capable of transduction and can move host DNA between cells.

Recent work on a member of this Jumbophage group, 201phi2-1 demonstrated the ablity to form nucleoid like compartments in which DNA replication and transcription take place but translation and capsid formation take place externally. Phabio and Noxifer are also able to produce compartments in P. fluorescens SBW25 during infection and these cause visible perturbations of the cells under light microscopy (Phase and DIC). We have used fluorescent microscopy to visualize the host genome during phage infection and found that host DNA appears to persist in our cells during viral infection. The persistence of this fluorescently labeled host DNA may help us to elucidate the mechanism that makes transduction common in Jumbophages.