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Isolation and Characterization of Microbacterium phage Etta and Discovery of Bacteriophage Vers Using a Novel Antarctic Cryobacterium Isolate

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Bacteriophages are some of the most prolific and diverse beings on the planet, however, comparatively little is known about their diversity. The aim of this project was to understand the diversity and characteristics of phages that infect members of the Microbacteriaceae family of Actinobacteria. This family includes bacteria common to terrestrial plant and soil environments, such as Microbacterium folorium, as well as psychrophilic bacteria common to glacial environments, such as Cryobacterium. Soil samples were collected from (46.866729 N, 96.75782 W), and direct isolation on M. folorium was used to identify a cluster EA1 phage, Etta. Etta is a lytic phage from the EA cluster and the EA1 subcluster. It is a siphoviridae with small round plaques with low to moderate turbidity. Etta has a genome that is 41542 bp, with 63.3% GC content, and is closely related to phages Gelo (99% identity) and Calix (99% identity). To extend our analysis of Microbacteriaceae phage diversity, we developed methods allowing for the isolation of a phage through the infection of a novel Antarctic psychrophilic Cryobacterium isolated from a supraglacial stream. Water was collected from (44.872171 N, 91.938466 W) and traditional phage isolation methods were modified to create a protocol which would allow for the discovery of phages at 4°C, leading to the isolation of bacteriophage Vers. Interestingly, Vers is a phage with the ability to infect multiple bacteria in a cold environment and can be propagated at 4°C using both Microbacterium foliorium and Cryobacterium isolate as a host. This experiment provides insight into the diversity of phages and how characteristics and genetics vary in phages isolated from different environments and hosts.