Microbiological, Molecular and Biochemical Characterization of Mycrobacteriophage Macayla

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ABSTRACT

Bacteriophages (viruses that infect bacteria) are the most abundant organisms in the biosphere. Mycobacteriophages are phages that infect bacteria of the genus *Mycobacterium.* Mycobacteriophages are found in soil and water throughout the planet. At this time, only a few dozen mycobacteriophages' genomes have been fully sequenced. None of these phages has the same genetic sequence. This suggests a great amount of diversity from billions of years of viral evolution via recombination and horizontal exchange. The extent of phage genomic diversity is of great interest and could shed light on the diversity of the phage population as a whole. Research has shown that phages play a larger role in human diseases than was previously recognized. Previous studies of mycobacteriophages have allowed biologists to make advances in mycobacterial genetics and understanding the pathogenicity of organisms such as *Mycobacterium tuberculosis* that cause human disease. Through continued studies of phages, the understanding of mycobacterial genetics will continue to expand and develop new techniques to fight disease. Testing soil and water samples throughout Montana to identify previously unknown viruses and to characterize the newly discovered mycobacteriophages and their genes could provide tools to the biomedical community in the fight against infectious diseases.

Mycobacteriophage "Macayla" was isolated on February 28, 2006. Macayla was discovered by a fourth grader who participated in Little Digger Day, one of many outreach programs run at Montana Tech. A pure high-titre phage stock of Mycobacteriophage Macayla was generated allowing for the purification of Macayla's DNA and comparison to other phages' DNA using restrictive enzyme digestion and gel electrophoresis. Macayla was tested for its ability to infect six different species of *Mycobacterium*, determining its host range. Macayla was confirmed to be a temperate phage, which can latently infect its host and later enter a lytic phase upon changing environmental conditions, with the isolation of a *Mycobacterium smegmatis*/Macayla lysogen. The characterization of Macayla by electron microscopy was achieved verifying Macayla to be morphologically distinct from another phage isolated in the Pedulla Laboratory. This presentation will present these results and discuss future steps to sequence Macayla's DNA and compare it to genetic sequences in the public databases. This work contributes to an understanding of the diversity among the mycobacteriophage population.

BIOGRAPHY

I was born and raised in Drummond, Montana, and graduated from Drummond High School. I have two brothers and a sister and enjoy spending time with my two nieces. My hobbies include crocheting, reading, and, currently, planning my wedding.

I am attending Montana Tech pursuing a Bachelor of Science degree in Biological Sciences. I currently work at Herberger's in the Butte Plaza Mall and participate in Undergraduate Research in Dr. Marisa Pedulla's laboratory studying mycobacteriophages. I will graduate from Montana Tech in May 2008. Upon graduation, I hope to conduct research in the biomedical field. My undergraduate research experience has been extremely motivating and has expanded my interest to conduct future research. I hope that I can one day use the knowledge and experience I have gained to be successful in my chosen career path.