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2024 SEA Symposium Abstract

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Unraveling the Mystery of novel Cluster F4 phage Lunastella

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The CDC estimates that antibiotic-resistant infections result in 2 million illnesses and 23,000 deaths per year. Bacteriophage (phage) are viruses with narrow bacterial host ranges that have been used as alternatives for a failing antibiotic arsenal. In order to understand the mechanisms of phage-mediated bacterial elimination, novel phage must be isolated and analyzed for specific functions that surpass the accuracy and efficiency of antibiotic treatment. LunaStella is a cluster F4 bacteriophage with a temperate lifestyle, which allows the phage to integrate its viral DNA into the bacterial host genome. Lunastella was isolated from soil in Carmel, Maine through enriched isolation with the host M. smegmatis strain mc2155. The genome is 55,791 base pairs in length and has a GC content of 62.4%. Out of the 91 putative genes, approximately 50% have no known function and 6 are orphams, or genes that are unique to Lunastella’s genome, adding to the novelty of this phage. As a phage belonging to a very small cluster, containing only three other sequenced phages, identification of the proteins encoded in Lunastella provides new information for phage research. Found on the right arm of the genome are 2 WhiB transcription factors and a Serine/Threonine kinase. The research and annotation of unique phages, like Lunastella, could provide new information that will aid in development of new treatments for antibiotic resistant bacterial pathogens.