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2022 SEA Symposium Abstract

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Discovering Phage From Soil Samples

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A bacteriophage is a virus that infects a host cell and replicates themselves using the resources provided by the host cell. Phages can be found throughout the world as there are about 1031 phages on our planet. By finding new bacteriophages, we are able to add them to a database with thousands of other bacteriophages that can be compared. The discovery of these phages can also potentially be used for treating bacterial infection diseases. We took an extract from a soil sample and mixed it with bacteria to see if there was a phage present in the soil sample. After a phage was found, we purified the phage and isolated plaques. These plaques are formed by bacteriophages injecting their DNA into mycobacterium, the mycobacterium replicates the phages which creates phage proteins, which are then assembled into phage particles which then cause host lysis. These dead bacteria cause clear plaques in the bacterial growth. We used several methods to isolate and characterize these phage samples such as filtration and spot testing, serial dilutions, restriction enzyme digestion and electrophoresis of genomic DNA, and staining phage particles for transmission electron microscopy (TEM). The TEM was used to obtain images of the phage particle morphology which show the virus capsid with the non-contractile tail. Restriction enzyme digest was used to show the genome contains double stranded DNA. From these results we were able to determine phage morphology, plaque morphology, phage particle head diameter and tail length in nanometers, and DNA restriction digestion patterns. As the use of antibiotics increases, the bacteria adapt to them and grow a resistance which leads to the failure of antibiotics. An alternative for the antibiotic treatment is the use of phages which use already discovered phages to eliminate the bacteria curing the infection. This method has already been used for several patients who have developed immunity to antibiotics. By discovering more phages, we can continue to grow treatment options for various infection-related illnesses through phage therapy.