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Hold the Antibiotics, Pass the Mayonnaise! A Novel Cluster A4 Mycobacteriophage

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Over 86,000 people are currently living with a Nontuberculosis mycobacteria (NTM) lung infection in the United States. These kinds of infections are highly antibiotic resistant and therefore increasingly more difficult to treat. Bacteriophages offer an alternative approach to combating antibiotic resistant bacterial illnesses. Mycobacteriophages are viruses that selectively infect *Mycobacterium* spp. Phage therapy is growing increasingly useful in fighting NTM infections, as it targets dangerous bacteria without harming human cells. We characterized and isolated the novel temperate mycobacteriophage Mayonnaise, collected and enriched from garden bed soil at the University of Maine. Mayonnaise is a cluster A4 phage with *Siphovirida*e morphology. The genome contains 48,222 bp and has 63.9% GC content, with the structural genes on the left arm and DNA replication genes on the right arm. There are 77 protein-coding genes and no tRNAs. On the right arm of the genome there are many genes that are reverse transcribed. The nucleotide sequence of Mayonnaise is highly conserved across the A4 cluster except for a unique indel of ~3000bp. Mayonnaise has an immunity repressor and serine integrase, (gp67 and gp33, respectively). Mayonnaise has many genes with no known function on the left arm of the genome. Further research is needed to understand the functions of these genes and their role in the life cycle of phage Mayonnaise. Our work aims to increase our understanding of mycobacteriophage genome organization and infection events, strengthening the groundwork for future biomedical interventions in phage therapy.