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Genomic and biological characterization of the Cluster AY temperate bacteriophage Anekin

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Viruses are infectious particles that infect all forms of life. We are particularly interested in bacteriophages (phages), viruses that infect only microorganisms such as bacteria. Phages can infect their hosts through two main cycles: the lytic cycle, which results in cell lysis, and the temperate cycle, which involves genomic integration. Our laboratory focuses on phages that infect environmental microorganisms. In this study, we investigate Anekin, a phage isolated from enriched samples in 2022 at Benedictine University that infects the soil bacterium Arthrobacter globiformis B-2979. Preliminary results indicate that Anekin can infect across a range of temperatures (22°C–37°C), and its infectivity is concentration-dependent. Anekin produces 2 mm plaques with clear centers and cloudy edges, leading us to hypothesize that it follows a temperate infection cycle. To characterize Anekin, its genome was annotated by Oregon Coast Community College. Based on sequence similarity, Anekin was assigned to the Arthrobacter Cluster AY and shares 94% identity with phages Aikyam and Sakai. Genes required for the temperate cycle were identified, supporting our initial hypothesis. To further investigate its temperate nature, we isolated two lysogens and confirmed them through phage release assays. Ongoing work will investigate lysogen immunity by challenging these lysogens with Anekin and other known temperate phages, including a second Cluster AY phage, CookieBear. Future studies will focus on comparative genomic analyses to better understand host-phage interactions and lysogeny within Cluster AY Arthrobacter phages.