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Investigation of lytic behavior of phage Eraser from a cluster of temperate phages.

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Bacteriophages are the most abundant biological particles on earth, outnumbering bacteria 10:1. Arthrobacter globiformis is a soil-dwelling bacterium that students at the New York Institute of technology used as a host to isolate novel actinobacteriophages in Fall 2019. Three of these phages, Phives, Kaylissa and Eraser were characterized, sequenced, and annotated. All three phages belong to cluster AZ and are categorized as temperate phages due to a readily identifiable integrase gene. As predicted, Phives and Kaylissa form plaques with a “bulls-eye morphology”, in line with incomplete lysis and the formation of lysogens. However, Eraser forms plaques that are large, round, and clear. The lack of the turbid center denotes a possibility that Eraser does not employ the lysogenic aspect of the cycle to the same degree as the other phages. We wondered why Eraser displays fully lytic behavior. There are numerous genomic differences between Eraser, Kaylissa, and Phives that might explain this difference. The closest relatives to Eraser, Niobe, Asa16, Elezi, and London also have a hazy bulls-eye plaque morphology. We use computational tools in an attempt to identify the genetic changes that lead to altered plaquing behavior in Eraser as compared with other cluster AZ phages.