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Development of a Multi-Host Enrichment Approach for Phage Isolation

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Bacteriophages (phages) are often isolated using enrichment protocols that employ only a single host strain of bacteria. While this method has contributed to the isolation of tens of thousands of phages, single-host enrichments are time-consuming as they require a separate experimental set up for every host of interest. We sought to optimize phage isolation for multiple hosts by developing a multi-host enrichment process for soil-dwelling *Arthrobacter* phages. Multi-host enrichment cultures were prepared by incubating soil samples with PYCa liquid broth and a 48-hour multi-host *Arthrobacter* culture composed of *A. globiformis* (B-2880), *A. atrocyaneous* (NRRL-B-2883), *A. sulfureus* (ATCC 19098) and *A. sp* (ATCC 21022). The multi-host *Arthrobacter* culture was prepared by combining each of the four hosts at identical CFU/ml. All multi-host enrichment cultures were incubated with shaking at 30 ℃ for 48 hours before screening for phage presence via spot tests on each of the same four strains of *Arthrobacter*. For all samples that had a positive spot test, phage purification and amplification were carried out following SEA-PHAGES’ protocols. Using this approach we successfully isolated phages on all four *Arthrobacter* host strains, including the first *A. sulfureus* and *A. atrocyaneous* phages isolated at the University of California, Los Angeles (UCLA). These preliminary findings suggest that a multi-host enrichment protocol may offer a simple solution for saving labor during the phage isolation process, as well as possibly increase the number of phages isolated on currently undersampled hosts.