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Isolation and Annotation of Bacteriophage Yaboi

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We present here an investigation into the largely untapped diversity of bacteriophage. In the experiment, a bacteriophage, dubbed Yaboi, was collected from a mulch sample from the median of Wydown Blvd at 38.6434 °N, 90.3157 °W, isolated, and purified using the bacterial culture *S. lividans*. A high titer lysate of $7.4x10^{10}$ pfu/mL was achieved through collecting plate lysates. A restriction enzyme digest of Yaboi genomic DNA with endonuclease *Bam*HI did not cut, and the restriction enzyme *HindIII* produced 19 bands during gel electrophoresis. Transmission Electron Microscopy of bacteriophage Yaboi revealed an icosahedral head and long, flexible tail. The head length was determined to be 86 nm, the head width 74 nm, and the tail length 413 nm. Preliminary analysis suggested that the phage was temperate, as it created bullseye plaques, with a clear center followed by a ring of bacteria, and then another clearing. Yaboi's genome length is 131, 251 bp, with a direct terminal repeat of 12,433 bp, and 251 genes. The GC content is 49.3%. Yaboi's cluster determination was BE2. In positional annotation, some unusual genes were found with little BLAST similarity to previously described phage proteins, and these included the gene at 11,219 to 11,007; 65,450 to 65,701; 85,405 to 85,560; and 117,859 to 111,359. Characterization of novel phages such as Yaboi creates a larger database with which researchers can compare other phages. Uncovering genetic variety in such a vast population of organisms allows for advancements in fields such as medicine and agriculture to develop, giving rise to technologies such as bacterial infection detection and vaccines.