The Host Range Specificity of Bacteriophage T4r

Zhong, Judy

A growing public health concern around the world is that of antibiotic resistance, which is when microorganisms can endure the effects of antibiotics due to natural evolution. One of the proposed solutions to combat this issue is bacteriophage therapy. Bacteriophages are viruses that infect bacteria, that being they are a sequence of genes. One of the complications with bacteriophages is that they have a very narrow host range. Thus, they are highly specific about the bacterial cells they can destroy and are prone to cause adverse effects. In this experiment, model organism bacteriophage T4r is subjected to evolutionary stress in order to induce a slight expansion in the host range. If bacteriophage T4r is exposed to different bacterial host species and later transduced, then it is probable that T4r's host range will expand when exposed to a closely genetically related host bacteria. The experiment will introduce T4r to a variety of bacterial hosts and transduce the phage to another set of host species. Through this procedure, the expansion patterns of T4r can be noted through the plaque assays. Data collected and verified shows that there is indeed a positive association between genetics and host range expansion, thus supporting my initial hypothesis. Knowledge gained from this experiment can be used to explore the genetics-host range relationship and lead to the engineered range expansion of phages. With a slight decrease in specificity, bacteriophages can be used to more effectively combat antibiotic resistance.

Awards Won: