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2021 SEA Faculty Meeting Abstract

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Teaching Students to Annotate Programmed Translational Frameshifts: A QUBES Pedagogical Resource for SEA-PHAGES Faculty

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Many actinobacteriophages have a programmed translational frameshift (PTFS) in their genomes, which encodes and regulates the expression of two tail assembly chaperone protein products that differ in length but overlap in sequence. Both of these protein products are essential for the construction of the bacteriophage tail, and require specific steps to annotate properly during genome annotation. Understanding PTFS and how to properly annotate one in a bacteriophage genome are areas in which students struggle during the bioinformatics portion of the SEA Phage program. To address this, we developed teaching resources to help students understand the biology, discovery, and proper annotation of PTFS in bacteriophages. These resources include presentation materials about the biology of PTFS, instructions on how to annotate a PTFS in DNA Master and PECAAN, a guided scientific paper discussion activity, and a PTFS identification activity. Here, we discuss the implementation of these resources, successes and areas of improvement based on their use, and recommendations for instructors.