Small Ribozymes in Gut Bacteriophages and Their Potential Role in Microbiome-Virome Interactions

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Hepatitis delta virus (HDV)-like ribozymes belong to the class of small self-cleaving RNA enzymes, which catalyze a site-specific internal transesterification while exhibiting diverse sequences and structures [1]. However, the biological functions of these ribozymes, particularly minimal examples, remain largely unknown [2].

We computationally discovered thousands of minimal HDV-like ribozymes in bacteriophage genomes associated with the human gut. *In vitro* validation was performed on selected examples associated with viral tRNAs, coined theta ribozymes. We propose a novel biological function of these ribozymes, suggesting their involvement in tRNA maturation and the lytic-lysogenic switch of specific phages (Figure 1). Investigating the catalysis and regulation of theta ribozymes sheds light on the poorly understood implications of the microbiome-virome interactions of the human gut and their impact on health and disease.

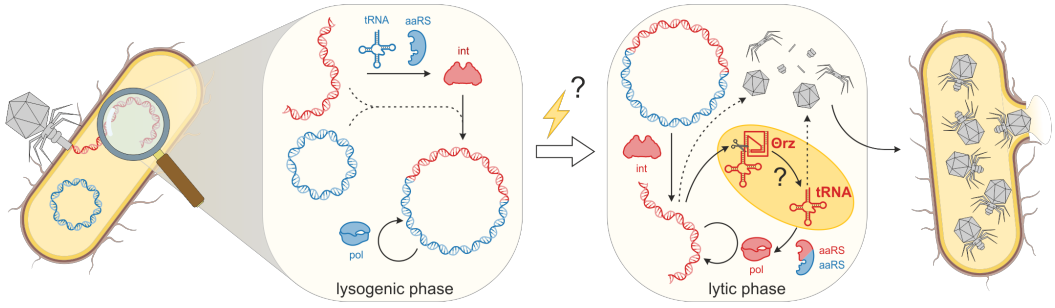


Figure 1: Proposed phage infection cycle involving theta ribozymes. aaRS: aminoacyl-synthetase; int: integrase; Θrz: theta ribozyme; pol: polymerase.

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