

Rutgers University
Hill Center - Room 705

**How Organisms Evolve to Recognize and Repress
Transposable Elements**

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Abstract

Transposable Elements (TEs) are the most widespread genetic parasites in eukaryotic genomes. Almost half of the human genome is explicitly derived from TE DNA. Many of these elements are remnants of past retroviral infections of the germ line that have kept intact important parts of their molecular replication machinery. Given the potential detrimental consequences of TE activity, host mechanisms of defense have evolved to identify and repress these transposons. For instance, recent progress has shed light on several molecular mechanisms that employ trans-acting repressors that recognize cis-acting sequences in a given TE, thereby blocking its expression. In this talk, I will present novel work regarding the evolution of these molecular mechanisms by which the host is able to learn to recognize and silence newly invading TEs. In particular, I will review basic aspects of the biology of piRNAs and show how these repressors evolve by means of new mutations that arise after their targets have invaded the host genome. Second, I will review the biology of the zinc finger/KAP1 transcriptional repressor complex, and show evidence that suggests that these repressors have been selected from existing genetic variation generated before their targets invaded the host genome. Finally, I will discuss some mathematical work motivated by the study of the dynamical processes by which the host population is able to produce and maintain a standing genetic variation of repressors.