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# Transposable elements in X-linked genes contribute to misexpression in *Drosophila mojavensis* and *D. arizonae* hybrids

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## Abstract

Hybrid sterility is a fast-evolving postzygotic mechanism that can reduce gene flow between incipient species. Regulatory networks divergence has been proposed as a potential mechanism underlying it. TE insertions have been identified as sources of regulatory sequences driving expression divergence in several biological contexts, such as the male germline. This study aims to identify if TE insertions in the regulatory regions can contribute to gene deregulation of sterile hybrids. For this, we took advantage of the recently diverged sister species *Drosophila mojavensis baja* and *D. arizonae*, that produce male sterile and fertile hybrids. Although the male sterile phenotype is attributed to multiple deregulated genes in germline, genes linked to the X chromosome have been demonstrated as major factors. We found that X chromosomes are enriched in TEs and in genes containing TEs for both species. X-linked genes were upregulated in the testis of sterile hybrids, in contrast to the fertile ones. These genes were enriched in TE insertions in their regulatory regions. Moreover, for X-linked upregulated genes in both hybrids and downregulated specifically in sterile hybrids, we also found an enrichment for TEs. However we found overall depletion of insertions for the autosomal genes. Our results suggest that TE insertions might play an evolutionary role in the divergence of the regulation of X-linked genes, that can lead to hybrid genome incompatibilities and, therefore, to sterility for these species.

**Keywords:** Hybrid sterility, Genomic incompatibilities, Regulatory divergence, Gene deregulation, Male germline

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