
P elements in *Drosophila willistoni* group species

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Abstract

The *P* transposable element invaded the *Drosophila melanogaster* natural populations between 1950 and 1970, following a horizontal transfer, likely from *Drosophila willistoni*. We analyzed by genomic DNA PCR and sequencing, the *P* element status in *willistoni* group species (*D. willistoni*, *D. equinoxialis*, *D. paulistorum*, *D. insularis*, *D. nebulosa*, *D. tropicalis*) in order to investigate what can be equilibrium states of the *P* family TEs on their long term in species (still active family or not). We found that potentially autonomous *P* elements appear to be still present in most of the *D. willistoni* and *D. equinoxialis* natural populations, whereas a large proportion of *D. paulistorum* and *D. tropicalis* collected lines apparently lack complete *P* copies. In addition, we have found in all except one more distant species (*D. nebulosa*) the presence of numerous *P*-MITEs (~200bp) with conserved sequences to be mobilized in *trans* and which appear to be identical by descent in all *willistoni* group species tested. They appear therefore to be old genome components present before species radiation. Strikingly, *D. insularis* appear to have retained only *P*-MITEs but no long *P* copies. We have found that most of the *willistoni* group species carry a common *P* element variant, named "protocanonical *P* element" (*pcP*), which differs from the canonical *P* element (*cP*) of *D. melanogaster* by three diagnostic marks including a SNP variation in the 3' Transposase Binding Site (TBS) which becomes therefore symmetrical with the 5' TBS, a situation distinctive from that of *cP* elements. Finally, small RNA sequencing in *D. willistoni*, *D. equinoxialis* and *D. tropicalis* ovaries showed the presence of sense and antisense *P*-homologous piRNAs, indicating a *P* repression based on a canonical germline piRNA mechanism. The evolutionary perspectives of the *P* family in the *willistoni* group species will be discussed.

Keywords: P elements, *Drosophila willistoni*, long term homeostasis

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