

## GEPHE SUMMARY

HP1D2 ( <a href="https://www.gephebase.org/search-criteria?/and+Gene">https://www.gephebase.org/search-criteria?/and+Gene</a> Gephebase= <sup>^</sup> HP1D2 <sup>^</sup> #gephebase-summary-title)	Gephebase Gene	GP00001467	GepheID
Published	Entry Status	Courtier	Main curator

## PHENOTYPIC CHANGE

Physiology ( <a href="https://www.gephebase.org/search-criteria?/and+Trait">https://www.gephebase.org/search-criteria?/and+Trait</a> Category= <sup>^</sup> Physiology <sup>^</sup> #gephebase-summary-title)	Trait Category		
Sex determination (sex ratio distortion) ( <a href="https://www.gephebase.org/search-criteria?/and+Trait=&lt;sup&gt;^&lt;/sup&gt;Sex determination (sex ratio distortion)&lt;sup&gt;^&lt;/sup&gt;#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Trait=<sup>^</sup>Sex determination (sex ratio distortion)<sup>^</sup>#gephebase-summary-title</a> )	Trait		
No sex ratio distortion when crossed with sensitive strains	Trait State in Taxon A		
Sex ratio distortion when crossed with sensitive strains	Trait State in Taxon B		
Taxon A	Ancestral State		
Intraspecific ( <a href="https://www.gephebase.org/search-criteria?/and+Taxonomic">https://www.gephebase.org/search-criteria?/and+Taxonomic</a> Status= <sup>^</sup> Intraspecific <sup>^</sup> #gephebase-summary-title)	Taxonomic Status		
	Taxon A	Taxon B	
Drosophila simulans ( <a href="https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=&lt;sup&gt;^&lt;/sup&gt;Drosophila simulans&lt;sup&gt;^&lt;/sup&gt;#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=<sup>^</sup>Drosophila simulans<sup>^</sup>#gephebase-summary-title</a> )	Latin Name	Drosophila simulans ( <a href="https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=&lt;sup&gt;^&lt;/sup&gt;Drosophila simulans&lt;sup&gt;^&lt;/sup&gt;#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=<sup>^</sup>Drosophila simulans<sup>^</sup>#gephebase-summary-title</a> )	Latin Name
-	Common Name	-	Common Name
-	Synonyms	-	Synonyms
species	Rank	species	Rank
cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Protostomia; Ecdysozoa; Panarthropoda; Arthropoda; Mandibulata; Pancrustacea; Hexapoda; Insecta; Dicondylia; Pterygota; Neoptera; Holometabola; Diptera; Brachycera; Muscomorpha; Eremoneura; Cyclorrhapha; Schizophora; Acalyptera; Ephydroidea; Drosophilidae; Drosophilinae; Drosophilini; Drosophila; Sophophora; melanogaster group; melanogaster subgroup	Lineage	cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Protostomia; Ecdysozoa; Panarthropoda; Arthropoda; Mandibulata; Pancrustacea; Hexapoda; Insecta; Dicondylia; Pterygota; Neoptera; Holometabola; Diptera; Brachycera; Muscomorpha; Eremoneura; Cyclorrhapha; Schizophora; Acalyptera; Ephydroidea; Drosophilidae; Drosophilinae; Drosophilini; Drosophila; Sophophora; melanogaster group; melanogaster subgroup	Lineage
melanogaster subgroup () - (Rank: species subgroup) ( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=32351">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=32351</a> )	Parent	melanogaster subgroup () - (Rank: species subgroup) ( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=32351">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=32351</a> )	Parent
7240 ( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=7240">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=7240</a> )	NCBI Taxonomy ID	7240 ( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=7240">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=7240</a> )	NCBI Taxonomy ID
No	is Taxon A an Intraspecies?	No	is Taxon B an Intraspecies?

## GENOTYPIC CHANGE

HP1D2	Generic Gene Name	B4R6K0 ( <a href="http://www.uniprot.org/uniprot/B4R6K0">http://www.uniprot.org/uniprot/B4R6K0</a> )	UniProtKB Drosophila simulans
Dsim\GD16106; dsim_GLEANR_16343; GD16106; HP1D2; Dsim_GD16106	Synonyms	()	GenebankID or UniProtKB
-	String		
-	Sequence Similarities		
-	GO - Molecular Function		
-	GO - Biological Process		
-	GO - Cellular Component		
GO:0005634 : nucleus ( <a href="https://www.ebi.ac.uk/QuickGO/term/GO:0005634">https://www.ebi.ac.uk/QuickGO/term/GO:0005634</a> )			Presumptive Null
Yes ( <a href="https://www.gephebase.org/search-criteria?/and+Presumptive Null=&lt;sup&gt;^&lt;/sup&gt;Yes&lt;sup&gt;^&lt;/sup&gt;#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Presumptive Null=<sup>^</sup>Yes<sup>^</sup>#gephebase-summary-title</a> )			

Coding (<https://www.gephebase.org/search-criteria?/and+Molecular+Type=^Coding^#gephebase-summary-title>)

Molecular Type

Deletion (<https://www.gephebase.org/search-criteria?/and+Aberration+Type=^Deletion^#gephebase-summary-title>)

Aberration Type

100-999 bp

Deletion Size

deletion of 371bp that removes one-half (371bp) of the HP1D2 coding sequence resulting in a frameshift that prevents the translation of the C-terminal chromo shadow domain (CSD) mediating protein

Molecular Details of the Mutation

Linkage Mapping (<https://www.gephebase.org/search-criteria?/and+Experimental+Evidence=^Linkage+Mapping^#gephebase-summary-title>)

Experimental Evidence

Rapid evolution of a Y-chromosome heterochromatin protein underlies sex chromosome meiotic drive. (2016) (<https://pubmed.ncbi.nlm.nih.gov/26979956>)

Main Reference

Helleu Q; GÃ©rard PR; Dubrulle R; Ogereau D; Prud'homme B; Loppin B; Montchamp-Moreau C

Authors

Sex chromosome meiotic drive, the non-Mendelian transmission of sex chromosomes, is the expression of an intragenomic conflict that can have extreme evolutionary consequences. However, the molecular bases of such conflicts remain poorly understood. Here, we show that a young and rapidly evolving X-linked heterochromatin protein 1 (HP1) gene, HP1D2, plays a key role in the classical Paris sex-ratio (SR) meiotic drive occurring in *Drosophila simulans*. Driver HP1D2 alleles prevent the segregation of the Y chromatids during meiosis II, causing female-biased sex ratio in progeny. HP1D2 accumulates on the heterochromatic Y chromosome in male germ cells, strongly suggesting that it controls the segregation of sister chromatids through heterochromatin modification. We show that Paris SR drive is a consequence of dysfunctional HP1D2 alleles that fail to prepare the Y chromosome for meiosis, thus providing evidence that the rapid evolution of genes controlling the heterochromatin structure can be a significant source of intragenomic conflicts.

Abstract

Additional References

## RELATED GEPHE

2 (Distorter on the X (Dox), Not much yang (Nmy)) (<https://www.gephebase.org/search-criteria?/or+Taxon+ID=^7240^/and+Trait=Sex+determination/and+groupHaplotypes=true#gephebase-summary-title>)

Related Genes

No matches found.

Related Haplotypes

## EXTERNAL LINKS

## COMMENTS

@Epistasis - The phenotype is present in males only and is observed by assessing the sex ratio in its progeny when crossed with a sensitive female carrying standard chromosomes (with no suppressor loci). The HP1D2 gene has been lost in *D. melanogaster*; but is found in many other *Drosophila* species. Null mutation. A sex ratio distortion phenotype appears when abolishing the HP1D2 gene and is rescued by a full coding HP1D2 gene. Epistatic interactions with many loci : (1) the level of sex ratio distortion caused by the HP1D2 locus is influenced by another X-linked locus named Dp[SR] whose underlying causing gene(s) have not yet been identified. (2) the sex ratio distortion is also abolished by autosomal suppressor loci whose underlying causing genes have not yet been identified. (3) there are sensitive Y chromosomes and insensitive Y chromosomes in *D. simulans*.