

GEPHE SUMMARY

	Gephebase Gene	GephelD
Lethal Hybrid rescue (https://www.gephebase.org/search-criteria/?and+Gene Gephebase=^Lethal Hybrid rescue^#gephebase-summary-title)	GP00000541	
	Entry Status	Main curator
Published	Martin	

PHENOTYPIC CHANGE

	Trait Category
Physiology (https://www.gephebase.org/search-criteria/?and+Trait Category=^Physiology^#gephebase-summary-title)	
Hybrid incompatibility (F1 male lethality) (https://www.gephebase.org/search-criteria/?and+Trait=^Hybrid incompatibility (F1 male lethality)^#gephebase-summary-title)	Trait
Drosophila melanogaster	Trait State in Taxon A
Drosophila simulans	Trait State in Taxon B
Data not curated	Ancestral State
Interspecific (https://www.gephebase.org/search-criteria/?and+Taxonomic Status=^Interspecific^#gephebase-summary-title)	Taxonomic Status

Taxon A	Latin Name	Taxon B	Latin Name
Drosophila melanogaster (https://www.gephebase.org/search-criteria/?and+Taxon and Synonyms=^Drosophila melanogaster^#gephebase-summary-title)	Common Name	Drosophila simulans (https://www.gephebase.org/search-criteria/?and+Taxon and Synonyms=^Drosophila simulans^#gephebase-summary-title)	Common Name
fruit fly	Synonyms	-	Synonyms
Sophophora melanogaster; fruit fly; Drosophila melanogaster Meigen, 1830; Sophophora melanogaster (Meigen, 1830); Drosophila melangaster	Rank	species	Rank
species	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; Acalyptratae; Ephydroidea; Drosophilidae; Drosophilinae; Drosophilini; Drosophila; Sophophora; melanogaster group; melanogaster subgroup	Lineage
melanogaster subgroup () - (Rank: species subgroup) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 32351)	Parent	melanogaster subgroup () - (Rank: species subgroup) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 32351)	NCBI Taxonomy ID
7227 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 7227)	NCBI Taxonomy ID	7240 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 7240)	is Taxon B an Infraspecies?
No	is Taxon A an Infraspecies?	No	

GENOTYPIC CHANGE

	Generic Gene Name	UniProtKB Drosophila melanogaster
Lhr		
CG18468; Dmel\CG18468; HP3; LHR; LHR[[mel]]; mel-Lhr; Dmel_CG18468	Synonyms	Q95RV3 (http://www.uniprot.org/uniprot/Q95RV3)
7227.FBpp0086073 (http://string-db.org/newstring_cgi/show_network_section.pl?identifier= 7227.FBpp0086073)	String	KMY94534 (https://www.ncbi.nlm.nih.gov/nuccore/KMY94534)
-	Sequence Similarities	
GO:0003677 : DNA binding (https://www.ebi.ac.uk/QuickGO/term/GO:0003677)	GO - Molecular Function	
GO:0000070 : mitotic sister chromatid segregation (https://www.ebi.ac.uk/QuickGO/term/GO:0000070)	GO - Biological Process	

GO:0010529 : negative regulation of transposition
(<https://www.ebi.ac.uk/QuickGO/term/GO:0010529>)

GO:0010528 : regulation of transposition
(<https://www.ebi.ac.uk/QuickGO/term/GO:0010528>)

GO:0000723 : telomere maintenance
(<https://www.ebi.ac.uk/QuickGO/term/GO:0000723>)

GO:0070868 : heterochromatin organization involved in chromatin silencing
(<https://www.ebi.ac.uk/QuickGO/term/GO:0070868>)

GO - Cellular Component

GO:0005634 : nucleus (<https://www.ebi.ac.uk/QuickGO/term/GO:0005634>)

GO:0000775 : chromosome, centromeric region
(<https://www.ebi.ac.uk/QuickGO/term/GO:0000775>)

GO:0000792 : heterochromatin (<https://www.ebi.ac.uk/QuickGO/term/GO:0000792>)

GO:0035012 : polytene chromosome, telomeric region
(<https://www.ebi.ac.uk/QuickGO/term/GO:0035012>)

GO:0010369 : chromocenter (<https://www.ebi.ac.uk/QuickGO/term/GO:0010369>)

Presumptive Null

No (<https://www.gephebase.org/search-criteria?/and+Presumptive+Null=^No^#gephebase-summary-title>)

Molecular Type

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

Aberration Type

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

Molecular Details of the Mutation

Coding divergence in a conserved stretch of 10 C-terminal amino-acids

Experimental Evidence

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

Main Reference

An indel polymorphism in the hybrid incompatibility gene lethal hybrid rescue of *Drosophila* is functionally relevant. (2012) (<https://pubmed.ncbi.nlm.nih.gov/22865735>)

Authors

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Abstract

Hybrid incompatibility (HI) genes are frequently observed to be rapidly evolving under selection. This observation has led to the attractive conjecture that selection-derived protein-sequence divergence is culpable for incompatibilities in hybrids. The *Drosophila simulans* HI gene Lethal hybrid rescue (Lhr) is an intriguing case, because despite having experienced rapid sequence evolution, its HI properties are a shared function inherited from the ancestral state. Using an unusual *D. simulans* Lhr hybrid rescue allele, Lhr(2), we here identify a conserved stretch of 10 amino acids in the C terminus of LHR that is critical for causing hybrid incompatibility. Altering these 10 amino acids weakens or abolishes the ability of Lhr to suppress the hybrid rescue alleles Lhr(1) or Hmr(1), respectively. Besides single-amino-acid substitutions, Lhr orthologs differ by a 16-aa indel polymorphism, with the ancestral deletion state fixed in *D. melanogaster* and the derived insertion state at very high frequency in *D. simulans*. Lhr(2) is a rare *D. simulans* allele that has the ancestral deletion state of the 16-aa polymorphism. Through a series of transgenic constructs we demonstrate that the ancestral deletion state contributes to the rescue activity of Lhr(2). This indel is thus a polymorphism that can affect the HI function of Lhr.

Additional References

RELATED GEPHE

Related Genes

6 (gfzf, Hybrid male rescue, JYalpha, Nup160, Nup96, tyrosyl-tRNA synthetase (mt-TyrRS)) (<https://www.gephebase.org/search-criteria?/or+Taxon+ID=^7227^/and+Trait=Hybrid+incompatibility/or+Taxon+ID=^7240^/and+Trait=Hybrid+incompatibility/and+groupHaplotypes=true#gephebase-summary-title>)

Related Haplotypes

1 (<https://www.gephebase.org/search-criteria?/or+Gene+Gephebase=^Lethal+Hybrid+rescue^/and+Taxon+ID=^7227^/or+Gene+Gephebase=^Lethal+Hybrid+rescue^/and+Taxon+ID=^7240^#gephebase-summary-title>)

EXTERNAL LINKS

COMMENTS