

GEPHE SUMMARY

para (kdr) (https://www.gephebase.org/search-criteria?/and+Gene Gephebase='para (kdr)'#gephebase-summary-title)	Gephebase Gene	GephelD
	GP00002645	Main curator
Published	Entry Status	Courtier

PHENOTYPIC CHANGE

Trait Category		
Physiology (https://www.gephebase.org/search-criteria?/and+Trait Category='Physiology'#gephebase-summary-title)	Trait	
Xenobiotic resistance (insecticide) (https://www.gephebase.org/search-criteria?/and+Trait='Xenobiotic resistance (insecticide)'#gephebase-summary-title)	Trait State in Taxon A	
Musca domestica	Trait State in Taxon B	
Musca domestica - resistant - kdr+T9291	Ancestral State	
Taxon A	Taxonomic Status	
Intraspecific (https://www.gephebase.org/search-criteria?/and+Taxonomic Status='Intraspecific'#gephebase-summary-title)		
Taxon A	Latin Name	Latin Name
Musca domestica (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms='Musca domestica'#gephebase-summary-title)		
house fly	Common Name	Common Name
house fly; Musca domestica Linnaeus, 1758	Synonyms	Synonyms
species	Rank	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; Calyptratae; Muscoidea; Muscidae; Muscinae; Muscini; Musca; Musca	Lineage	Lineage
Musca () - (Rank: subgenus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 44052)	Parent	Parent
7370 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 7370)	NCBI Taxonomy ID	NCBI Taxonomy ID
No	is Taxon A an Infraspecies?	is Taxon B an Infraspecies?

GENOTYPIC CHANGE

Generic Gene Name		
para	Synonyms	UniProtKB Drosophila melanogaster
bas; bss; CG9907; Dmel\CG9907; DmNav; DmNav1; DmNa[[v]]; DmNa[[V]]; DmNa[[v]]; I(1)14Da; I(1)ESHS48; lncRNA.S9469; Nav1; Ocd; olfD; par; sbl; sbl-1; Shu; Shudderer	P35500 (http://www.uniprot.org/uniprot/P35500)	GenebankID or UniProtKB
7227.FBpp0303597 (http://string-db.org/newstring_cgi/show_network_section.pl?identifier= 7227.FBpp0303597)	String	NP_001273814 (https://www.ncbi.nlm.nih.gov/nuccore/NP_001273814)
Belongs to the sodium channel (TC 1.A.1.10) family. Para subfamily.	Sequence Similarities	
	GO - Molecular Function	
GO:0005509 : calcium ion binding (https://www.ebi.ac.uk/QuickGO/term/GO:0005509)		
GO:0005244 : voltage-gated ion channel activity (https://www.ebi.ac.uk/QuickGO/term/GO:0005244)		
GO:0005248 : voltage-gated sodium channel activity (https://www.ebi.ac.uk/QuickGO/term/GO:0005248)		

GO:0005272 : sodium channel activity

(<https://www.ebi.ac.uk/QuickGO/term/GO:0005272>)

GO - Biological Process

GO:0045433 : male courtship behavior, veined wing generated song production

(<https://www.ebi.ac.uk/QuickGO/term/GO:0045433>)

GO:0001666 : response to hypoxia (<https://www.ebi.ac.uk/QuickGO/term/GO:0001666>)

GO:0009612 : response to mechanical stimulus

(<https://www.ebi.ac.uk/QuickGO/term/GO:0009612>)

GO:0034765 : regulation of ion transmembrane transport

(<https://www.ebi.ac.uk/QuickGO/term/GO:0034765>)

GO:0035725 : sodium ion transmembrane transport

(<https://www.ebi.ac.uk/QuickGO/term/GO:0035725>)

GO:0007638 : mechanosensory behavior

(<https://www.ebi.ac.uk/QuickGO/term/GO:0007638>)

GO:0060078 : regulation of postsynaptic membrane potential

(<https://www.ebi.ac.uk/QuickGO/term/GO:0060078>)

GO - Cellular Component

GO:0005887 : integral component of plasma membrane

(<https://www.ebi.ac.uk/QuickGO/term/GO:0005887>)

GO:0001518 : voltage-gated sodium channel complex

(<https://www.ebi.ac.uk/QuickGO/term/GO:0001518>)

Presumptive Null

No ([https://www.gephebase.org/search-criteria?/and+Presumptive Null=%27No%27#gephebase-summary-title](https://www.gephebase.org/search-criteria?/and+Presumptive%20Null=%27No%27#gephebase-summary-title))

Molecular Type

Coding ([https://www.gephebase.org/search-criteria?/and+Molecular Type=%27Coding%27#gephebase-summary-title](https://www.gephebase.org/search-criteria?/and+Molecular%20Type=%27Coding%27#gephebase-summary-title))

Aberration Type

SNP ([https://www.gephebase.org/search-criteria?/and+Aberration Type=%27SNP%27#gephebase-summary-title](https://www.gephebase.org/search-criteria?/and+Aberration%20Type=%27SNP%27#gephebase-summary-title))

SNP Coding Change

Nonsynonymous

Molecular Details of the Mutation

kdr+T929I - addition of T929I to the kdr mutation (L1014F) increased resistance to all pyrethroids (except etofenprox) and enhanced resistance by ~1000-fold to acrinathrin and flumethrin.

Experimental Evidence

Candidate Gene ([https://www.gephebase.org/search-criteria?/and+Experimental Evidence=%27Candidate Gene%27#gephebase-summary-title](https://www.gephebase.org/search-criteria?/and+Experimental%20Evidence=%27Candidate%20Gene%27#gephebase-summary-title))

	Taxon A	Taxon B	Position
Codon	-	-	-
Amino-acid	Thr	Ile	929

Main Reference

Two novel house fly Vssc mutations, D600N and T929I, give rise to new insecticide resistance alleles. (2017) (<https://pubmed.ncbi.nlm.nih.gov/29183579>)

Authors

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Abstract

The house fly, *Musca domestica*, is a serious pest because it transmits a large diversity of human and veterinary diseases. Insecticides, particularly pyrethroids, are commonly used to control house flies. However, the evolution of pyrethroid resistance has reduced the effectiveness of these insecticides. A major mechanism of resistance to pyrethroids is target site insensitivity caused by the mutations in the voltage-sensitive sodium channel (Vssc) gene (e.g. kdr [L1014F] and super-kdr [M918T+L1014F]). Recently, two novel Vssc alleles, super-kdr+D600N and kdr+T929I were detected in a field collected resistant house fly population in Kansas, USA in 2013. To determine the levels of resistance that these new alleles confer to pyrethroids, we isolated strains having the unique Vssc alleles, but being otherwise congenic to the susceptible strain, aaby. We compared levels of resistance conferred to 14 pyrethroids and determined the inheritance of resistance to 8 pyrethroids. Our results revealed that super-kdr+D600N conferred higher levels of resistance to seven pyrethroids relative to super-kdr, and kdr+T929I showed super-kdr-like levels of resistance in house flies. Our results are compared with previous studies and reveal that addition of T929I to the kdr mutation (L1014F) increased resistance to all pyrethroids (except etofenprox), and enhanced resistance by ~1000-fold to acrinathrin and flumethrin. The implications of these results on the evolution of resistance are discussed.

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Additional References

RELATED GEPHE

Related Genes

5 (Acetylcholinesterase (Ace-2), Acetylcholinesterase (Ace), CYP6D1, esterase isozyme E7 = E3, resistance to dieldrin) ([https://www.gephebase.org/search-criteria?/or+TaxonID=%277370%27/and+Trait=Xenobiotic resistance/and+groupHaplotypes=true#gephebase-summary-title](https://www.gephebase.org/search-criteria?/or+TaxonID=%277370%27/and+Trait=Xenobiotic%20resistance/and+groupHaplotypes=true#gephebase-summary-title))

Related Haplotypes

3 ([https://www.gephebase.org/search-criteria?/or+Gene Gephebase=%27para \(kdr\)%27/and+Taxon ID=%277370%27/or+Gene Gephebase=%27para \(kdr\)%27/and+Taxon ID=%277370%27#gephebase-summary-title](https://www.gephebase.org/search-criteria?/or+Gene%20Gephebase=%27para%20(kdr)%27/and+Taxon%20ID=%277370%27/or+Gene%20Gephebase=%27para%20(kdr)%27/and+Taxon%20ID=%277370%27#gephebase-summary-title))

EXTERNAL LINKS

COMMENTS