

GEPHE SUMMARY

	Gephebase Gene	GepheID
para (kdr) (<a +para+(kdr)^#gephebase-summary-title"="" href="https://www.gephebase.org/search-criteria?/and+Gene+Gephebase=">https://www.gephebase.org/search-criteria?/and+Gene+Gephebase="+para+(kdr)^#gephebase-summary-title)	GP00002524	Main curator
	Entry Status	Courtier
Published		

PHENOTYPIC CHANGE

	Trait Category		
Physiology (<a +physiology^#gephebase-summary-title"="" href="https://www.gephebase.org/search-criteria?/and+Trait+Category=">https://www.gephebase.org/search-criteria?/and+Trait+Category="+Physiology^#gephebase-summary-title)			
	Trait		
Xenobiotic resistance (insecticide) (<a +xenobiotic+resistance+(insecticide)^#gephebase-summary-title"="" href="https://www.gephebase.org/search-criteria?/and+Trait=">https://www.gephebase.org/search-criteria?/and+Trait="+Xenobiotic+resistance+(insecticide)^#gephebase-summary-title)			
	Trait State in Taxon A		
Culex quinquefasciatus			
	Trait State in Taxon B		
Culex quinquefasciatus - resistant			
	Ancestral State		
Taxon A			
	Taxonomic Status		
Intraspecific (<a +intraspecific^#gephebase-summary-title"="" href="https://www.gephebase.org/search-criteria?/and+Taxonomic+Status=">https://www.gephebase.org/search-criteria?/and+Taxonomic+Status="+Intraspecific^#gephebase-summary-title)			
Taxon A		Taxon B	
	Latin Name		Latin Name
Culex quinquefasciatus (<a +culex+quinquefasciatus^#gephebase-summary-title"="" href="https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=">https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms="+Culex+quinquefasciatus^#gephebase-summary-title)		Culex quinquefasciatus (<a +culex+quinquefasciatus^#gephebase-summary-title"="" href="https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=">https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms="+Culex+quinquefasciatus^#gephebase-summary-title)	
	Common Name		Common Name
southern house mosquito		southern house mosquito	
	Synonyms		Synonyms
Culex fatigans; Culex pipiens fatigans; Culex pipiens quinquefasciatus; southern house mosquito; Culex fatigan; Culex pipiens quinquefasciatus; Culex quinquefasciatus; Culex quinquefasciatus; Culex quinquefasciatus		Culex fatigans; Culex pipiens fatigans; Culex pipiens quinquefasciatus; southern house mosquito; Culex fatigan; Culex pipiens quinquefasciatus; Culex quinquefasciatus; Culex quinquefasciatus; Culex quinquefasciatus	
	Rank		Rank
species		species	
	Lineage		Lineage
cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Protostomia; Ecdysozoa; Panarthropoda; Arthropoda; Mandibulata; Pancrustacea; Hexapoda; Insecta; Dicondylia; Pterygota; Neoptera; Holometabola; Diptera; Nematocera; Culicomorpha; Culicoidea; Culicidae; Culicinae; Culicini; Culex; Culex; Culex pipiens complex		cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Protostomia; Ecdysozoa; Panarthropoda; Arthropoda; Mandibulata; Pancrustacea; Hexapoda; Insecta; Dicondylia; Pterygota; Neoptera; Holometabola; Diptera; Nematocera; Culicomorpha; Culicoidea; Culicidae; Culicinae; Culicini; Culex; Culex; Culex pipiens complex	
	Parent		Parent
Culex pipiens complex () - (Rank: no rank) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=518105)		Culex pipiens complex () - (Rank: no rank) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=518105)	
	NCBI Taxonomy ID		NCBI Taxonomy ID
7176 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=7176)		7176 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=7176)	
	is Taxon A an Infrappecies?		is Taxon B an Infrappecies?
No		No	

GENOTYPIC CHANGE

	Generic Gene Name	UniProtKB Drosophila melanogaster
para	P35500 (http://www.uniprot.org/uniprot/P35500)	GenebankID or UniProtKB
	Synonyms	
bas; bss; CG9907; Dmel[CG9907]; DmNav; DmNav1; DmNa[[v]]; DmNa[[V]]; DmNa[[v]]1; l(1)14Da; l(1)ESH548; lincRNA.S9469; Nav1; Ocd; olfD; par; sbl; sbl-1; Shu; Shudderer	()	
	String	
7227.FBpp0303597 (http://string-db.org/newstring.cgi/show_network_section.pl?identifier=7227.FBpp0303597)		
	Sequence Similarities	
Belongs to the sodium channel (TC 1.A.1.10) family. Para subfamily.		
	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=^No^#gephebase-summary-title>)

Molecular Type

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

Aberration Type

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

SNP Coding Change

Nonsynonymous

Molecular Details of the Mutation

L1014F

Experimental Evidence

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

	Taxon A	Taxon B	Position
Codon	-	-	-
Amino-acid	-	-	-

Main Reference

Resistance in the mosquito, *Culex quinquefasciatus*, and possible mechanisms for resistance. (2005) (<https://pubmed.ncbi.nlm.nih.gov/16032654>)

Authors

Xu Q; Liu H; Zhang L; Liu N

Abstract

Two mosquito strains of *Culex quinquefasciatus* (Say), MAmCq(G0) and HAmCq(G0), were collected from Mobile and Huntsville, Alabama, respectively. MAmCq(G0) and HAmCq(G0) were further selected in the laboratory with permethrin for one and three generations, respectively. The levels of resistance to permethrin in MAmCq(G1) (after one-generation selection) and HAmCq(G3) (after three-generation selection) increased rapidly. Resistance to permethrin in MAmCq(G1) and HAmCq(G3) was partially suppressed by piperonyl butoxide (PBO), S,S,S-tributylphosphorotrithioate (DEF) and diethyl maleate (DEM), inhibitors of cytochrome P450 monooxygenases, hydrolases and glutathione S-transferases (GST), respectively, suggesting these three enzyme families are important in conferring permethrin resistance in both strains. A substitution of leucine to phenylalanine (L to F) resulting from a single nucleotide polymorphism (SNP), termed the *kdr* mutation, in the para-homologous sodium channel gene has been reported as a very common mutation associated with pyrethroid resistance of insects. A 341-bp sodium channel gene fragment, where the *kdr* mutation resides, was generated by PCR from genomic DNAs of *Cx. quinquefasciatus* strains. We found that the *kdr* mutation was present in both permethrin-selected and unselected HAmCq and MAmCq mosquito populations, suggesting that the *kdr* mutation plays the role in permethrin resistance. There was no significant change in the frequency and heterozygosity of the A to T SNP for the *kdr* allele between permethrin-selected and unselected MAmCq and HAmCq mosquitoes, indicating that other mechanisms are involved in the evolution of resistance in mosquitoes selected by permethrin in the laboratory.

Copyright 2005 Society of Chemical Industry.

Additional References

Molecular biology of insect sodium channels and pyrethroid resistance. (2014) (<https://pubmed.ncbi.nlm.nih.gov/24704279>)

RELATED GEPHE

Related Genes

4 (Cpm1, esterase B1 + esterase A, esterase B1 = esterase beta1, resistance to dieldrin) (<https://www.gephebase.org/search-criteria?/or+Taxon ID=^7176^/and+Trait=Xenobiotic resistance/and+groupHaplotypes=true#gephebase-summary-title>)

Related Haplotypes

1 ([https://www.gephebase.org/search-criteria?/or+Gene Gephebase=^para \(kdr\)^/and+Taxon ID=^7176^/or+Gene Gephebase=^para \(kdr\)^/and+Taxon ID=^7176^#gephebase-summary-title](https://www.gephebase.org/search-criteria?/or+Gene Gephebase=^para (kdr)^/and+Taxon ID=^7176^/or+Gene Gephebase=^para (kdr)^/and+Taxon ID=^7176^#gephebase-summary-title))

EXTERNAL LINKS

COMMENTS