

para (kdr) (https://www.gephebase.org/search-criteria?/and+Gene+Gephebase=~para+(kdr)~#gephebase-summary-title)	Gephebase Gene	GepheID
	GP00000833	Main curator
Draft	Entry Status	Martin

Physiology (#gpepbase-summary-title)		Trait Category	
Xenobiotic resistance (insecticide) (https://www.gephebase.org/search-criteria?/and+Trait=~Xenobiotic resistance (insecticide)^#gpepbase-summary-title)		Trait	
Heliothis virescens		Trait State in Taxon A	
Heliothis virescens - resistant - allele 1		Trait State in Taxon B	
Taxon A		Ancestral State	
Intraspecific (#gpepbase-summary-title)		Taxonomic Status	
Taxon A		Taxon B	
Heliothis virescens (#gpepbase-summary-title)		Heliothis virescens (#gpepbase-summary-title)	
tobacco budworm		tobacco budworm	
tobacco budworm; Chloridea virescens; Helicoverpa virescens; Heliothis virescens (Fabricius, 1777)		tobacco budworm; Chloridea virescens; Helicoverpa virescens; Heliothis virescens (Fabricius, 1777)	
species		species	
cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Protostomia; Ecdysozoa; Panarthropoda; Arthropoda; Mandibulata; Pancrustacea; Hexapoda; Insecta; Dicondylia; Pterygota; Neoptera; Holometabola; Amphiesmenoptera; Lepidoptera; Glossata; Neolepidoptera; Heteroneura; Ditrysia; Obtectomera; Noctuoidea; Noctuidae; Heliothinae; Heliothis		cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Protostomia; Ecdysozoa; Panarthropoda; Arthropoda; Mandibulata; Pancrustacea; Hexapoda; Insecta; Dicondylia; Pterygota; Neoptera; Holometabola; Amphiesmenoptera; Lepidoptera; Glossata; Neolepidoptera; Heteroneura; Ditrysia; Obtectomera; Noctuoidea; Noctuidae; Heliothinae; Heliothis	
Heliothis () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=7101)		Heliothis () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=7101)	
7102 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=7102)		7102 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=7102)	
is Taxon A an Intraspecies?		is Taxon B an Intraspecies?	
No		No	

para	Generic Gene Name	UniProtKB Drosophila melanogaster
	Synonyms	GenebankID or UniProtKB
bas; bss; CG9907; Dmel\CG9907; DmNav; DmNav1; DmNa[[v]]; DmNa[[V]]; DmNa[[v]]1; I(1)14Da; I(1)ESHS48; lincRNA.S9469; Nav1; Ocd; olfD; par; sbl; sbl-1; Shu; Shudderer	()	
7227.FBpp0303597 (http://string-db.org/newstring.cgi/show_network_section.pl?identifier= 7227.FBpp0303597)	String	
	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

L1029H (=position L1014)

Experimental Evidence

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

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

Main Reference

Functional and evolutionary consequences of pyrethroid resistance mutations in S6 transmembrane segments of a voltage-gated sodium channel. (2000)
(<https://pubmed.ncbi.nlm.nih.gov/11095943>)

Authors

Zhao Y; Park Y; Adams ME

Abstract

Pyrethroids are a class of voltage-dependent sodium channel modifiers widely used as insecticides for control of disease vectors and agricultural pests. Many insect populations have developed resistance to pyrethroids linked to nervous system insensitivity and structural mutations in neuronal sodium channels. Pyrethroid resistant strains of the moth *Heliothis virescens* carry single point mutations leading to amino acid substitutions in either transmembrane segment I-S6 (V421M) or II-S6 (L1029H) of the para-homologous sodium channel. We analyzed the consequences of V421M and L1029H mutations constructed in the *Drosophila* para sodium channel heterologously expressed in *Xenopus* oocytes, and found that both mutations confer channel insensitivity to permethrin, with the L1029H mutation having a more pronounced effect. Both mutations also modify the intrinsic voltage-dependent gating properties of the channel, but L1029H less so than V421M. These results suggest that mutation V421M exacts a higher fitness cost than L1029H, providing a plausible explanation for genetic succession observed in field strains, where V421M was replaced by L1029H during the past decade.

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Additional References

The L1014F point mutation in the house fly *Vssc1* sodium channel confers knockdown resistance to pyrethroids. (1997) (<https://pubmed.ncbi.nlm.nih.gov/9474777>)
A novel mutation L1029H in sodium channel gene *hscp* associated with pyrethroid resistance for *Heliothis virescens* (Lepidoptera:Noctuidae). (1997)
(<https://pubmed.ncbi.nlm.nih.gov/9061924>)

RELATED GEPHE

Related Genes

2 (ABCC2, cadherin) (<https://www.gephebase.org/search-criteria?/or+Taxon ID=~7102~/and+Trait=Xenobiotic resistance/and+groupHaplotypes=true#gephebase-summary-title>)

Related Haplotypes

2 ([https://www.gephebase.org/search-criteria?/or+Gene Gephebase=~para \(kdr\)~/and+Taxon ID=~7102~/or+Gene Gephebase=~para \(kdr\)~/and+Taxon ID=~7102~#gephebase-summary-title](https://www.gephebase.org/search-criteria?/or+Gene Gephebase=~para (kdr)~/and+Taxon ID=~7102~/or+Gene Gephebase=~para (kdr)~/and+Taxon ID=~7102~#gephebase-summary-title))

EXTERNAL LINKS

