

## GEPHE SUMMARY

para (kdr) ( <a href="https://www.gephebase.org/search-criteria?/and+Gene Gephebase='para (kdr)'#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Gene Gephebase='para (kdr)'#gephebase-summary-title</a> )	Gephebase Gene	GephelD
	GP00001859	Main curator
Published	Entry Status	Courtier

## PHENOTYPIC CHANGE

Trait Category		
Physiology ( <a href="https://www.gephebase.org/search-criteria?/and+Trait Category='Physiology'#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Trait Category='Physiology'#gephebase-summary-title</a> )	Trait	
Xenobiotic resistance (insecticide) ( <a href="https://www.gephebase.org/search-criteria?/and+Trait='Xenobiotic resistance (insecticide)'#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Trait='Xenobiotic resistance (insecticide)'#gephebase-summary-title</a> )	Trait State in Taxon A	
Cimex lectularius	Trait State in Taxon B	
Cimex lectularius - resistant	Ancestral State	
Taxon A	Taxonomic Status	
Intraspecific ( <a href="https://www.gephebase.org/search-criteria?/and+Taxonomic Status='Intraspecific'#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Taxonomic Status='Intraspecific'#gephebase-summary-title</a> )		
Taxon A	Latin Name	Latin Name
Cimex lectularius ( <a href="https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms='Cimex lectularius'#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms='Cimex lectularius'#gephebase-summary-title</a> )		
bed bug	Common Name	Common Name
bed bug; Cimex lectularius Linnaeus, 1758; Cimex lectularis	Synonyms	Synonyms
species	Rank	Rank
cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Protostomia; Ecdysozoa; Panarthropoda; Arthropoda; Mandibulata; Pancrustacea; Hexapoda; Insecta; Dicondylia; Pterygota; Neoptera; Paraneoptera; Hemiptera; Prosrhyncha; Heteroptera; Euheteroptera; Neoheteroptera; Panheteroptera; Cimicomorpha; Cimicoidea; Cimicidae; Cimex	Lineage	Lineage
Cimex () - (Rank: genus) ( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 30079">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 30079</a> )	Parent	Parent
79782 ( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 79782">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 79782</a> )	NCBI Taxonomy ID	NCBI Taxonomy ID
	is Taxon A an Infraspecies?	is Taxon B an Infraspecies?
No		

## 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 ( <a href="http://www.uniprot.org/uniprot/P35500">http://www.uniprot.org/uniprot/P35500</a> )	GenebankID or UniProtKB
7227.FBpp0303597 ( <a href="http://string-db.org/newstring_cgi/show_network_section.pl?identifier= 7227.FBpp0303597">http://string-db.org/newstring_cgi/show_network_section.pl?identifier= 7227.FBpp0303597</a> )	String	0
Belongs to the sodium channel (TC 1.A.1.10) family. Para subfamily.	Sequence Similarities	
GO:0005509 : calcium ion binding ( <a href="https://www.ebi.ac.uk/QuickGO/term/GO:0005509">https://www.ebi.ac.uk/QuickGO/term/GO:0005509</a> )	GO - Molecular Function	
GO:0005244 : voltage-gated ion channel activity ( <a href="https://www.ebi.ac.uk/QuickGO/term/GO:0005244">https://www.ebi.ac.uk/QuickGO/term/GO:0005244</a> )		
GO:0005248 : voltage-gated sodium channel activity ( <a href="https://www.ebi.ac.uk/QuickGO/term/GO:0005248">https://www.ebi.ac.uk/QuickGO/term/GO:0005248</a> )		

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>)

#### Mutation #1

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

L925I

Experimental Evidence

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

	Taxon A	Taxon B	Position
Codon	CTT	ATT	-
Amino-acid	Leu	Ile	925

#### Main Reference

Biochemical and molecular analysis of deltamethrin resistance in the common bed bug (Hemiptera: Cimicidae). (2008) (<https://pubmed.ncbi.nlm.nih.gov/19058634>)

Authors

Yoon KS; Kwon DH; Strycharz JP; Hollingsworth CS; Lee SH; Clark JM

Abstract

This study establishes deltamethrin resistance in a common bed bug, *Cimex lectularius* L., population collected from New York City (NY-BB). The NY-BB population was 264-fold more resistant to 1% deltamethrin in contact bioassay compared with an insecticide-susceptible population collected in Florida (FL-BB). General esterase, glutathione S-transferase, and 7-ethoxycoumarin O-deethylase activities of NY-BB were not statistically different from those of FL-BB. cDNA fragments that encoded the open reading frame of voltage-sensitive sodium channel alpha-subunit genes from the FL-BB and NY-BB populations, respectively, were obtained by homology probing polymerase chain reaction (PCR) and sequenced. Sequence alignment of the internal and 5' and 3' rapid amplification of cDNA ends (RACE) fragments generated a 6500-bp cDNA sequence contig, which was composed of a 6084-bp open reading frame (ORF) encoding 2027 amino acid residues and 186-bp 5' and 230-bp 3' untranslated regions (5' and 3' UTRs, respectively). Sequence comparisons of the open reading frames of the alpha-subunit genes identified two point mutations (V419L and L925I) that were presented only in the NY-BB population. L925I, located the intracellular loop between IIS4 and IIS5, has been previously found in a highly pyrethroid-resistant populations of whitefly (*Bemisia tabaci*). V419L, located in the IS6 transmembrane segment, is a novel mutation. A Val to Met mutation at the corresponding position of the bed bug V419, however, has been identified in the tobacco budworm as a kdr-type mutation. This evidence suggests that the two mutations are likely the major resistance-causing mutations in the deltamethrin-resistant NY-BB through a knockdown-type nerve insensitivity mechanism.

Additional References

Biochemical and molecular analysis of deltamethrin resistance in the common bed bug (Hemiptera: Cimicidae). (2008) (<https://pubmed.ncbi.nlm.nih.gov/19058634>)

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

Infestation by pyrethroids resistant bed bugs in the suburb of Paris, France. (2012) (<https://pubmed.ncbi.nlm.nih.gov/23193523>)

#### Mutation #2

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

V419M - a Val to Met mutation at the corresponding position of the bed bug V419 has been identified in the tobacco budworm *Heliothis virescens* (Park et al. 1997) and functionally validated as a kdr-type mutation (Lee and Soderlund 2001)

Experimental Evidence

Taxon A	Taxon B	Position	
Codon	GTC	CTC	-
Amino-acid	Val	Met	419

Biochemical and molecular analysis of deltamethrin resistance in the common bed bug (Hemiptera: Cimicidae). (2008) (<https://pubmed.ncbi.nlm.nih.gov/19058634>)

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Abstract

Biochemical and molecular analysis of deltamethrin resistance in the common bed bug (Hemiptera: Cimicidae). (2008) (<https://pubmed.ncbi.nlm.nih.gov/19058634>)

Establishment of quantitative sequencing and filter contact vial bioassay for monitoring pyrethroid resistance in the common bed bug, *Cimex lectularius*. (2010)

(<https://pubmed.ncbi.nlm.nih.gov/20695274>)

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

Infestation by pyrethroids resistant bed bugs in the suburb of Paris, France. (2012) (<https://pubmed.ncbi.nlm.nih.gov/23193523>)

Additional References

## RELATED GEPHE

No matches found.

Related Genes

No matches found.

Related Haplotypes

## EXTERNAL LINKS

## COMMENTS

@SeveralMutationsWithEffect The other species name used in publications is: *Cimex lectularis*.