

GEPHE SUMMARY

| | | | |
|--|----------------|------------|--------------|
| 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) | Gephebase Gene | GP00001859 | GepheID |
| Published | Entry Status | Courtier | Main curator |

PHENOTYPIC CHANGE

| | | | |
|---|------------------------|--|--|
| 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 Category | | |
| 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 | | |
| Cimex lectularius | Trait State in Taxon A | | |
| Cimex lectularius - resistant | Trait State in Taxon B | | |
| Taxon A | Ancestral State | | |
| 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) | Taxonomic Status | | |

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

GENOTYPIC CHANGE

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

Mutation #1

No (<https://www.gephebase.org/search-criteria?/and+Presumptive Null=^No^#gephebase-summary-title>) Presumptive Null
Coding (<https://www.gephebase.org/search-criteria?/and+Molecular Type=^Coding^#gephebase-summary-title>) Molecular Type
SNP (<https://www.gephebase.org/search-criteria?/and+Aberration Type=^SNP^#gephebase-summary-title>) Aberration Type
Nonsynonymous SNP Coding Change
L925I Molecular Details of the Mutation
Candidate Gene (<https://www.gephebase.org/search-criteria?/and+Experimental Evidence=^Candidate Gene^#gephebase-summary-title>) Experimental Evidence

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

Biochemical and molecular analysis of deltamethrin resistance in the common bed bug (Hemiptera: Cimicidae). (2008) (<https://pubmed.ncbi.nlm.nih.gov/19058634>) Main Reference
Yoon KS; Kwon DH; Strycharz JP; Hollingsworth CS; Lee SH; Clark JM Authors

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 in 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

No (<https://www.gephebase.org/search-criteria?/and+Presumptive Null=^No^#gephebase-summary-title>) Presumptive Null
Coding (<https://www.gephebase.org/search-criteria?/and+Molecular Type=^Coding^#gephebase-summary-title>) Molecular Type
SNP (<https://www.gephebase.org/search-criteria?/and+Aberration Type=^SNP^#gephebase-summary-title>) Aberration Type
Nonsynonymous SNP Coding Change
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) Molecular Details of the Mutation
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>)

Main Reference

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

Authors

Abstract

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Additional References

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>)

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*.