GEPHE SUMMARY

Gephebase Gene
para (kdr) (https://www.gephebase.org/search-criteria?/and+Gene Gephebase=^para (kdr)^#gephebase-summary-title)

GepheID
GP00000825

Entry Status
Published

Main curator
Martin

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
Blatella germanica

Trait State in Taxon B
Blatella germanica - resistant - allele 2

Ancestral State
Taxon A

Taxonomic Status
Intraspecific (https://www.gephebase.org/search-criteria?/and+Taxonomic Status=^Intraspecific^#gephebase-summary-title)

Taxon A

Latin Name
Blattella germanica (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=^Blattella germanica^#gephebase-summary-title)

Common Name
German cockroach

Synonyms
German cockroach; Blattella germanica (Linnaeus, 1767); Blatella germanica

Rank
species

Lineage
cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Protostomia; Ecdysozoa; Panarthropoda; Arthropoda; Mandibulata; Pancrustacea; Hexapoda; Insecta; Dicondylia; Pterygota; Neoptera; Polyneoptera; Dictyoptera; Blattodea; Blaberoidea; Ectobiidae; Blattellinae; Blattella

Parent
Blattella () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 6972)

NCBI Taxonomy ID
6973 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 6973)

is Taxon A an Infraspecies?
No

Taxon B

Latin Name
Blattella germanica (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=^Blattella germanica^#gephebase-summary-title)

Common Name
German cockroach

Synonyms
German cockroach; Blattella germanica (Linnaeus, 1767); Blatella germanica

Rank
species

Lineage
cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Protostomia; Ecdysozoa; Panarthropoda; Arthropoda; Mandibulata; Pancrustacea; Hexapoda; Insecta; Dicondylia; Pterygota; Neoptera; Polyneoptera; Dictyoptera; Blattodea; Blaberoidea; Ectobiidae; Blattellinae; Blattella

Parent
Blattella () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 6972)

NCBI Taxonomy ID
6973 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 6973)

is Taxon B an Infraspecies?
No

GENOTYPIC CHANGE

Generic Gene Name
para

Synonyms
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

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

UniProtKB Drosophila melanogaster
P35500 (http://www.uniprot.org/uniprot/P35500)

GenebankID or UniProtKB
AGW43268 (https://www.ncbi.nlm.nih.gov/nuccore/AGW43268)

(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

C764R (=C785R)

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

Novel point mutations in the German cockroach para sodium channel gene are associated with knockdown resistance (kdr) to pyrethroid insecticides. (2000)
(https://pubmed.ncbi.nlm.nih.gov/10899465)

Authors

Liu Z; Valles SM; Dong K

Abstract

Knockdown resistance (kdr) to pyrethroid insecticides has been attributed to point mutations in the para sodium channel gene in more than a half dozen insect pest species. In this study, we identified two novel para mutations in five highly resistant kdr-type German cockroach strains. The two mutations, from glutamic acid (E434) to lysine (K434) and from cysteine (C764) to arginine (R764), respectively, are located in the first intracellular linker connecting domains I and II. E434K is located near the beginning of the linker (closest to domain I), whereas C764R is found toward the end of the linker (closest to domain II). Two additional mutations from aspartic acid (D58) to glycine (G58), and from proline (P1880) to leucine (L1888), respectively, were found in one of the resistant strains. The four mutations coexist with the previously identified leucine to phenylalanine (L993F) kdr mutation in IIS6, and are present only in the highly resistant individuals of a given strain. These findings suggest that these mutations might be responsible for high levels of knockdown resistance toward pyrethroid insecticides in the German cockroach.

Additional References

Synergistic interaction between two cockroach sodium channel mutations and a tobacco budworm sodium channel mutation in reducing channel sensitivity to a pyrethroid insecticide. (2002)
(https://pubmed.ncbi.nlm.nih.gov/11886774)
Novel sodium channel gene mutations in Blattella germanica reduce the sensitivity of expressed channels to deltamethrin. (2002) (https://pubmed.ncbi.nlm.nih.gov/11886779)

RELATED GEPHE

Related Genes

1 (resistance to dieldrin) (https://www.gephebase.org/search-criteria?/or+Taxon ID=^6973^/and+Trait=Xenobiotic resistance/and+groupHaplotypes=true#gephebase-summary-title)

Related Haplotypes

3 (https://www.gephebase.org/search-criteria?/or+Gene Gephebase=^para (kdr)^/and+Taxon ID=^6973^/or+Gene Gephebase=^para (kdr)^/and+Taxon ID=^6973^#gephebase-summary-title)

EXTERNAL LINKS

COMMENTS