GEPHE SUMMARY

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

GepheID
GP00002534

Entry Status
Published

Main curator
Courtier

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
Stomoxys calcitrans

Trait State in Taxon B
Stomoxys calcitrans - resistant

Ancestral State
Taxon A

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

Taxon A

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

Common Name
stable fly

Synonyms
Stomoxis calcitrans; stable fly; biting house fly

Rank
species

Lineage
cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Protostomia; Ecdysozoa; Panarthropoda; Arthropoda; Mandibulata; Pancrustacea; Hexapoda; Insecta; Dicondylia; Pterygota; Neoptera; Endopterygota; Diptera; Brachycera; Muscomorpha; Eremoneura; Cyclorrhapha; Schizophora; Calyptratae; Muscoidea; Muscidae; Muscinae; Stomoxyini; Stomoxys

Parent
Stomoxys () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 35569)

NCBI Taxonomy ID
35570 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 35570)

is Taxon A an Infraspecies?
No

Taxon B

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

Common Name
stable fly

Synonyms
Stomoxis calcitrans; stable fly; biting house fly

Rank
species

Lineage
cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Protostomia; Ecdysozoa; Panarthropoda; Arthropoda; Mandibulata; Pancrustacea; Hexapoda; Insecta; Dicondylia; Pterygota; Neoptera; Endopterygota; Diptera; Brachycera; Muscomorpha; Eremoneura; Cyclorrhapha; Schizophora; Calyptratae; Muscoidea; Muscidae; Muscinae; Stomoxyini; Stomoxys

Parent
Stomoxys () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 35569)

NCBI Taxonomy ID
35570 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 35570)

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)

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

GenebankID or UniProtKB
()

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

L1014H

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

Identification of a mutation associated with permethrin resistance in the para-type sodium channel of the stable fly (Diptera: Muscidae). (2011) (https://pubmed.ncbi.nlm.nih.gov/21404865)

Authors

Olafson PU; Pitzer JB; Kaufman PE

Abstract

The insect sodium channel is of particular interest for evaluating resistance to pyrethroids because it is the target molecule for this major class of neurotoxic insecticides. The stable fly, Stomoxys calcitrans (L.) (Diptera: Muscidae), sodium channel coding sequence representing domains IS6 through IVS6 was isolated, and the sequence encoding domain II was compared among individuals of a laboratory strain selected for resistance to permethrin and the unselected, parental generation. A point mutation resulting in a leucine-to-histidine amino acid change was identified (Leul014His), and its location corresponded with that observed for knockdown resistance (kdr) mutations in other insects. As a result, the allele was designated kdr-his. A molecular assay was developed to assess the frequency of this mutation in genomic DNA of individual stable flies from the laboratory selections, which provided further evidence that the kdr-his allele accounts for the observed level ofpermethrin resistance in the selected strain. The assay was then used to evaluate the frequency of the mutation from five field-collected populations originating from three horse farms near Ocala, FL; one horse farm near Gainesville, FL; and one dairy farm near Hague, FL. Frequency of the kdr-his allele ranged from 0.46 to 0.78, supporting further investigation of allele prevalence throughout the stable fly season and in response to field insecticide application.

Additional References

Molecular biology of insect sodium channels and pyrethroid resistance. (2014) (https://pubmed.ncbi.nlm.nih.gov/24704279)
Frequency of kdr and kdr-his Alleles in Stable Fly (Diptera: Muscidae) Populations From the United States, Costa Rica, France, and Thailand. (2019)
(https://pubmed.ncbi.nlm.nih.gov/30768670)

RELATED GEPHE

Related Genes

No matches found.

Related Haplotypes

1 (https://www.gephebase.org/search-criteria?/or+Gene Gephebase=^para (kdr)^/and+Taxon ID=^35570^/or+Gene Gephebase=^para (kdr)^/and+Taxon ID=^35570^#gephebase-summary-title)

EXTERNAL LINKS