GEPHE SUMMARY

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

GepheID
GP00002515

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
Ctenocephalides felis

Trait State in Taxon B
Ctenocephalides felis - 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
Ctenocephalides felis (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=^Ctenocephalides felis^#gephebase-summary-title)

Common Name
cat flea

Synonyms
cat flea; Ctenocephalides felis (Bouche, 1835)

Rank
species

Lineage
cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Protostomia; Ecdysozoa; Panarthropoda; Arthropoda; Mandibulata; Pancrustacea; Hexapoda; Insecta; Dicondylia; Pterygota; Neoptera; Holometabola; Siphonaptera; Pulicomorpha; Pulicoidea; Pulicidae; Archaeopsyllinae; Ctenocephalides

Parent
Ctenocephalides () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 7514)

NCBI Taxonomy ID
7515 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 7515)

is Taxon A an Infraspecies?
No

Taxon B

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

Common Name
cat flea

Synonyms
cat flea; Ctenocephalides felis (Bouche, 1835)

Rank
species

Lineage
cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Protostomia; Ecdysozoa; Panarthropoda; Arthropoda; Mandibulata; Pancrustacea; Hexapoda; Insecta; Dicondylia; Pterygota; Neoptera; Holometabola; Siphonaptera; Pulicomorpha; Pulicoidea; Pulicidae; Archaeopsyllinae; Ctenocephalides

Parent
Ctenocephalides () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 7514)

NCBI Taxonomy ID
7515 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 7515)

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
()

(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

L1014F

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	Leu	Phe	1014

Main Reference

Identification of mutations associated with pyrethroid resistance in the para-type sodium channel of the cat flea, Ctenocephalides felis. (2004) (https://pubmed.ncbi.nlm.nih.gov/15544944)

Authors

Bass C; Schroeder I; Turberg A; M Field L; Williamson MS

Abstract

Knockdown resistance (kdr) to pyrethroid insecticides is caused by point mutations in the pyrethroid target site, the para-type sodium channel of nerve membranes. This most commonly involves alterations within the domain II (S4-S6) region of the channel protein where five different mutation sites have been identified across a range of insect species. To investigate the incidence of this mechanism in cat fleas, we have cloned and sequenced the IIS4-IIS6 region of the para sodium channel gene from seven laboratory flea strains. Analysis of these sequences revealed two amino acid replacements at residues previously implicated in pyrethroid resistance. One is the 'common' kdr mutation, a leucine to phenylalanine substitution (equivalent to L1014F of housefly) reported previously in several other insects. The other is a threonine to valine substitution (equivalent to T929V) and is a novel variant of the T929I mutation first identified in diamondback moth. The L1014F mutation was found at varying frequency in all of the laboratory flea strains, whereas the T929V mutation was found only in the highly resistant Cottontail strain. We have developed rapid PCR-based diagnostic assays for the detection of these mutations in individual cat fleas and used them to show that both L1014F and T929V are common in UK and US flea populations. This survey revealed a significant number of fleas that carry only the V929 allele indicating that co-expression with the F1014 allele is not necessary for flea viability.

Additional References

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

RELATED GEPHE

Related Genes

1 (resistance to dieldrin) (https://www.gephebase.org/search-criteria?/or+Taxon ID=^7515^/and+Trait=Xenobiotic resistance/and+groupHaplotypes=true#gephebase-summary-title)

Related Haplotypes

1 (https://www.gephebase.org/search-criteria?/or+Gene Gephebase=^para (kdr)^/and+Taxon ID=^7515^/or+Gene Gephebase=^para (kdr)^/and+Taxon ID=^7515^#gephebase-summary-title)

EXTERNAL LINKS

COMMENTS