

GEPHE SUMMARY

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

Gephebase Gene GP00002543

Entry Status Courtier

Published

GepheID Main curator

PHENOTYPIC CHANGE

Physiology ([https://www.gephebase.org/search-criteria?/and+Trait Category="+Physiology+"#gephebase-summary-title](https://www.gephebase.org/search-criteria?/and+Trait+Category=))

Trait Category

Xenobiotic resistance (insecticide) ([https://www.gephebase.org/search-criteria?/and+Trait="+Xenobiotic resistance \(insecticide\)+"#gephebase-summary-title](https://www.gephebase.org/search-criteria?/and+Trait=))

Trait

Drosophila melanogaster - sensitive to pyrethroids

Trait State in Taxon A

Drosophila melanogaster - resistant to pyrethroids

Trait State in Taxon B

Taxon A

Ancestral State

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

Taxonomic Status

Taxon A	Latin Name	Taxon B	Latin Name
Drosophila melanogaster (<a +drosophila+melanogaster+"#gephebase-summary-title"="" href="https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=">https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms="+Drosophila melanogaster+"#gephebase-summary-title)	Drosophila melanogaster	Drosophila melanogaster (<a +drosophila+melanogaster+"#gephebase-summary-title"="" href="https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=">https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms="+Drosophila melanogaster+"#gephebase-summary-title)	Drosophila melanogaster
fruit fly	Common Name	fruit fly	Common Name
Sophophora melanogaster; fruit fly; Drosophila melanogaster Meigen, 1830; Sophophora melanogaster (Meigen, 1830); Drosophila melangaster	Synonyms	Sophophora melanogaster; fruit fly; Drosophila melanogaster Meigen, 1830; Sophophora melanogaster (Meigen, 1830); Drosophila melangaster	Synonyms
species	Rank	species	Rank
cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Protostomia; Ecdysozoa; Panarthropoda; Arthropoda; Mandibulata; Pancrustacea; Hexapoda; Insecta; Dicondylia; Pterygota; Neoptera; Holometabola; Diptera; Brachycera; Muscomorpha; Eremoneura; Cyclorrhapha; Schizophora; Acalyptratae; Ephydroidea; Drosophilidae; Drosophilinae; Drosophilini; Drosophila; Sophophora; melanogaster group; melanogaster subgroup	Lineage	cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Protostomia; Ecdysozoa; Panarthropoda; Arthropoda; Mandibulata; Pancrustacea; Hexapoda; Insecta; Dicondylia; Pterygota; Neoptera; Holometabola; Diptera; Brachycera; Muscomorpha; Eremoneura; Cyclorrhapha; Schizophora; Acalyptratae; Ephydroidea; Drosophilidae; Drosophilinae; Drosophilini; Drosophila; Sophophora; melanogaster group; melanogaster subgroup	Lineage
melanogaster subgroup () - (Rank: species subgroup) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=32351)	Parent	melanogaster subgroup () - (Rank: species subgroup) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=32351)	Parent
7227 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=7227)	NCBI Taxonomy ID	7227 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=7227)	NCBI Taxonomy ID
No	is Taxon A an Intraspecies?	No	is Taxon B an Intraspecies?

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)ESH548; 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)

GenebankID or UniProtKB

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
 (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^#gepbase-summary-title)

Molecular Type

Coding (https://www.gephebase.org/search-criteria?/and+Molecular Type=^Coding^#gepbase-summary-title)

Aberration Type

SNP (https://www.gephebase.org/search-criteria?/and+Aberration Type=^SNP^#gepbase-summary-title)

SNP Coding Change

Nonsynonymous

Molecular Details of the Mutation

A1549V = A1410V

Experimental Evidence

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

	Taxon A	Taxon B	Position
Codon	-	-	-
Amino-acid	-	-	-

Main Reference

Point mutations in the Drosophila sodium channel gene para associated with resistance to DDT and pyrethroid insecticides. (1997) (https://pubmed.ncbi.nlm.nih.gov/9435785)

Authors

Pittendrigh B; Reenan R; ffrench-Constant RH; Ganetzky B

Abstract

The gene para in Drosophila melanogaster encodes an alpha subunit of voltage-activated sodium channels, the presumed site of action of DDT and pyrethroid insecticides. We used an existing collection of Drosophila para mutants to examine the molecular basis of target-site resistance to pyrethroids and DDT. Six out of thirteen mutants tested were associated with a largely dominant, 10- to 30-fold increase in DDT resistance. The amino acid lesions associated with these alleles defined four sites in the sodium channel polypeptide where a mutational change can cause resistance: within the intracellular loop between S4 and S5 in homology domains I and III, within the pore region of homology domain III, and within S6 in homology domain III. Some of these sites are analogous with those defined by knockdown resistance (kdr) and super-kdr resistance-associated mutations in houseflies and other insects, but are located in different homologous units of the channel polypeptide. We find a striking synergism in resistance levels with particular heterozygous combinations of para alleles that appears to mimic the super-kdr double mutant housefly phenotype. Our results indicate that the alleles analyzed from natural populations represent only a subset of mutations that can confer resistance. The implications for the binding site of pyrethroids and mechanisms of target-site insensitivity are discussed.

Additional References

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

RELATED GEPHE

Related Genes

19 (Acetylcholinesterase (Ace-2), alcohol dehydrogenase (Adh), Aldehyde dehydrogenase (Aldh), CG11699, Cyp12d1, Cyp28d1, Cyp28d1-Cyp28d2, cyp6d2, cyp6g1, glutamate-gated chloride channel (GluCl), GSS (glutathione synthetase), GSTE1-E10 cluster, kin of irre (kire), PHGPx, resistance to dieldrin, RnrS, SOD1, Ugt86Dd, CHKov1)
 (https://www.gephebase.org/search-criteria?/or+Taxon ID=^7227^/and+Trait=Xenobiotic resistance/and+groupHaplotypes=true#gepbase-summary-title)

Related Haplotypes

2 (https://www.gephebase.org/search-criteria?/or+Gene Gephebase=^para (kdr)^/and+Taxon ID=^7227^/or+Gene Gephebase=^para (kdr)^/and+Taxon ID=^7227^#gepbase-summary-title)

EXTERNAL LINKS

