GEPHE SUMMARY

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

GepheID
GP00000976

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
Drosophila simulans

Trait State in Taxon B
Drosophila simulans resistant - allele 3

Ancestral State
Taxon A

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

Taxon A

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

Common Name
-

Synonyms
-

Rank
species

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

Parent
melanogaster subgroup () - (Rank: species subgroup) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 32351)

NCBI Taxonomy ID
7240 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 7240)

is Taxon A an Infraspecies?
No

Taxon B

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

Common Name
-

Synonyms
-

Rank
species

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

Parent
melanogaster subgroup () - (Rank: species subgroup) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 32351)

NCBI Taxonomy ID
7240 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 7240)

is Taxon B an Infraspecies?
No

GENOTYPIC CHANGE

Generic Gene Name
Rdl

Synonyms
CG10537; CT29555; Dmel\CG10537; DmRdl; DmRDL; gaba; GABA; GABA-R; GABAr; GABA[[A]]; GABA[[A]] receptor; GABA[[A]]-R; GABA[[A]]R; LCCH1; Rd1; rdl; RDL

String
7227.FBpp0305970 (http://string-db.org/newstring_cgi/show_network_section.pl?identifier= 7227.FBpp0305970)

Sequence Similarities
Belongs to the ligand-gated ion channel (TC 1.A.9) family. Gamma-aminobutyric acid receptor (TC 1.A.9.5) subfamily.

GO - Molecular Function
GO:0004890 : GABA-A receptor activity (https://www.ebi.ac.uk/QuickGO/term/GO:0004890)
GO:0022851 : GABA-gated chloride ion channel activity

UniProtKB Drosophila melanogaster
P25123 (http://www.uniprot.org/uniprot/P25123)

GenebankID or UniProtKB
EDX09812 (https://www.ncbi.nlm.nih.gov/nuccore/EDX09812)

(https://www.ebi.ac.uk/QuickGO/term/GO:0022851)
GO:0030594 : neurotransmitter receptor activity
(https://www.ebi.ac.uk/QuickGO/term/GO:0030594)

GO - Biological Process

GO:0007165 : signal transduction (https://www.ebi.ac.uk/QuickGO/term/GO:0007165)
GO:0007268 : chemical synaptic transmission
(https://www.ebi.ac.uk/QuickGO/term/GO:0007268)
GO:0034220 : ion transmembrane transport
(https://www.ebi.ac.uk/QuickGO/term/GO:0034220)
GO:0042493 : response to drug (https://www.ebi.ac.uk/QuickGO/term/GO:0042493)
GO:0050877 : nervous system process
(https://www.ebi.ac.uk/QuickGO/term/GO:0050877)
GO:0042391 : regulation of membrane potential
(https://www.ebi.ac.uk/QuickGO/term/GO:0042391)
GO:0006811 : ion transport (https://www.ebi.ac.uk/QuickGO/term/GO:0006811)
GO:0042048 : olfactory behavior (https://www.ebi.ac.uk/QuickGO/term/GO:0042048)
GO:0030431 : sleep (https://www.ebi.ac.uk/QuickGO/term/GO:0030431)
GO:0009612 : response to mechanical stimulus
(https://www.ebi.ac.uk/QuickGO/term/GO:0009612)
GO:0002121 : inter-male aggressive behavior
(https://www.ebi.ac.uk/QuickGO/term/GO:0002121)
GO:0050805 : negative regulation of synaptic transmission
(https://www.ebi.ac.uk/QuickGO/term/GO:0050805)
GO:0042749 : regulation of circadian sleep/wake cycle
(https://www.ebi.ac.uk/QuickGO/term/GO:0042749)
GO:0090328 : regulation of olfactory learning
(https://www.ebi.ac.uk/QuickGO/term/GO:0090328)

GO - Cellular Component

GO:0016021 : integral component of membrane
(https://www.ebi.ac.uk/QuickGO/term/GO:0016021)
GO:0005886 : plasma membrane (https://www.ebi.ac.uk/QuickGO/term/GO:0005886)
GO:0005887 : integral component of plasma membrane
(https://www.ebi.ac.uk/QuickGO/term/GO:0005887)
GO:0030054 : cell junction (https://www.ebi.ac.uk/QuickGO/term/GO:0030054)
GO:0030425 : dendrite (https://www.ebi.ac.uk/QuickGO/term/GO:0030425)
GO:0043005 : neuron projection (https://www.ebi.ac.uk/QuickGO/term/GO:0043005)
GO:0030424 : axon (https://www.ebi.ac.uk/QuickGO/term/GO:0030424)
GO:0045211 : postsynaptic membrane
(https://www.ebi.ac.uk/QuickGO/term/GO:0045211)
GO:0045202 : synapse (https://www.ebi.ac.uk/QuickGO/term/GO:0045202)
GO:0034707 : chloride channel complex
(https://www.ebi.ac.uk/QuickGO/term/GO:0034707)
GO:0032589 : neuron projection membrane
(https://www.ebi.ac.uk/QuickGO/term/GO:0032589)
GO:0032809 : neuronal cell body membrane
(https://www.ebi.ac.uk/QuickGO/term/GO:0032809)

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

Ala302Gly

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

Expression of a Drosophila GABA receptor in a baculovirus insect cell system. Functional expression of insecticide susceptible and resistant GABA receptors from the cyclodiene resistance gene Rdl. (1993) (https://pubmed.ncbi.nlm.nih.gov/8262177)

Authors

Lee HJ; Rocheleau T; Zhang HG; Jackson MB; ffrench-Constant RH

Abstract

Recombinant baculoviruses containing two alternative splice forms of the Drosophila Rdl GABA receptor gene were constructed. Spodoptera frugiperda (Sf21) cells infected with either splice form expressed a transcript of expected size (2.5 kb). Western blotting of cell membrane extracts and immunoprecipitation experiments with an anti-Rdl antiserum recognized a protein of the expected size of approximately 65 kDa. Whole cell patch clamp analysis of cells infected with either splice form revealed functional expression of GABA gated chloride ion channels which were blocked by application of 1 microM picrotoxinin. Following replacement of alanine 302 with a serine, a mutation associated with resistance to picrotoxinin and cyclodiene insecticides, mutant channels showed similar levels of insensitivity to picrotoxinin (approximately 100-fold) as those observed in recordings from cultured Drosophila neurons. The significance of the expression of an insect GABA receptor in an insect cell line and the similarity of the results from these functional expression studies to recordings from cultured neurons is discussed.

Additional References

A single-amino acid substitution in a gamma-aminobutyric acid subtype A receptor locus is associated with cyclodiene insecticide resistance in Drosophila populations. (1993) (https://pubmed.ncbi.nlm.nih.gov/8095336)

RELATED GEPHE

Related Genes

1 (cyp6g1) (https://www.gephebase.org/search-criteria?/or+Taxon ID=^7240^/and+Trait=Xenobiotic resistance/and+groupHaplotypes=true#gephebase-summary-title)

Related Haplotypes

2 (https://www.gephebase.org/search-criteria?/or+Gene Gephebase=^resistance to dieldrin^/and+Taxon ID=^7240^/or+Gene Gephebase=^resistance to dieldrin^/and+Taxon ID=^7240^#gephebase-summary-title)

EXTERNAL LINKS

COMMENTS

http://flybase.org/reports/FBal0029508