## GEPHE SUMMARY

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

GepheID
GP00000979

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
Myzus persicae - sensitive

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

Common Name
green peach aphid

Synonyms
Myzus (Nectarosiphon) persicae; green peach aphid; peach-potato aphid; Myzus persicae (Sulzer, 1776); Myzus persiceae

Rank
species

Lineage
cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Protostomia; Ecdysozoa; Panarthropoda; Arthropoda; Mandibulata; Pancrustacea; Hexapoda; Insecta; Dicondylia; Pterygota; Neoptera; Paraneoptera; Hemiptera; Sternorrhyncha; Aphidomorpha; Aphidoidea; Aphididae; Aphidinae; Macrosiphini; Myzus

Parent
Myzus () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 13163 )

NCBI Taxonomy ID
13164 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 13164 )

is Taxon A an Infraspecies?
No

### Taxon B

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

Common Name
green peach aphid

Synonyms
Myzus (Nectarosiphon) persicae; green peach aphid; peach-potato aphid; Myzus persicae (Sulzer, 1776); Myzus persiceae

Rank
species

Lineage
cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Protostomia; Ecdysozoa; Panarthropoda; Arthropoda; Mandibulata; Pancrustacea; Hexapoda; Insecta; Dicondylia; Pterygota; Neoptera; Paraneoptera; Hemiptera; Sternorrhyncha; Aphidomorpha; Aphidoidea; Aphididae; Aphidinae; Macrosiphini; Myzus

Parent
Myzus () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 13163 )

NCBI Taxonomy ID
13164 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 13164 )

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 (https://www.ebi.ac.uk/QuickGO/term/GO:0022851)

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

GenebankID or UniProtKB
()

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

Duplication of the Rdl GABA receptor subunit gene in an insecticide-resistant aphid, Myzus persicae. (1998) (https://pubmed.ncbi.nlm.nih.gov/9862468)

Authors

Anthony N; Unruh T; Ganser D; ffrench-Constant R

Abstract

Resistance to cyclodiene insecticides is associated with replacements of a single amino acid (alanine 302) in a gamma-aminobutyric acid (GABA) receptor subunit encoded by the single-copy gene Resistance to dieldrin (Rdl). Alanine 302 is predicted to reside within the second membrane-spanning region of the Rdl receptor, a region that is thought to line the integral chloride ion channel pore. In all cyclodiene-resistant insects studied to date, this same alanine residue is replaced either by a serine, or, in some resistant strains of Drosophila simulans, a glycine residue. Therefore, individuals can carry only two different Rdl alleles. In contrast, here we report the presence of up to four different Rdl-like alleles in individual clones of the green peach aphid, Myzus persicae. In addition to the wild-type copy of Rdl gene (encoding A302 or allele A), M. persicae carries three other alleles with the following amino acid replacements: A302-->Glycine (allele G), A302-->SerineTCG (allele S) and A302-->SerineAGT (allele S'). Evidence from direct nucleotide sequencing and Single Stranded Conformational Polymorphism (SSCP) analysis shows that at least three of these different Rdl alleles (i.e. A, G and S) are commonly present in individual aphids or aphid clones. Southern analysis using allele-specific probes and analysis of sequences downstream of the exon containing the resistance-associated mutation confirm the presence of two independent Rdl-like loci in M. persicae. One locus carries the susceptible

alanine (A) and/or resistant glycine (G) allele while the other carries the two serine alleles (S or S'). Whereas resistance levels are correlated with the glycine replacement, the S allele was present in all aphid clones, regardless of their resistance status. These results suggest that target site insensitivity is associated with replacements at the first (A/G) but not the second (S/S') locus. Phylogenetic analysis of nucleotide sequences indicates that both putative aphid Rdl loci are monophyletic with respect to other insect Rdl genes and may have arisen through a recent gene duplication event. The implications of this duplication with respect to insecticide resistance and insect GABA receptor subunit diversity are discussed.

Additional References

## RELATED GEPHE

Related Genes

8 (acetyl-CoA carboxylase (ACC), Acetylcholinesterase (Ace-1), CYP6CY3, CYP6CY3-CYP6CY4, esterase E4, esterase FE4, nAChR, para (kdr)) (https://www.gephebase.org/search-criteria?/or+Taxon ID=^13164^/and+Trait=Xenobiotic resistance/and+groupHaplotypes=true#gephebase-summary-title)

Related Haplotypes

No matches found.

## EXTERNAL LINKS

## COMMENTS