

GEPHE SUMMARY

<p>esterase E4 (https://www.gephebase.org/search-criteria?/and+Gene+Gephebase=~esterase+E4^#gephebase-summary-title)</p> <p>Published</p>	<p>Gephebase Gene</p> <p>Entry Status</p>	<p>GP00000293</p> <p>Martin</p>	<p>GepheID</p> <p>Main curator</p>
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PHENOTYPIC CHANGE

<p>Physiology (https://www.gephebase.org/search-criteria?/and+Trait+Category=~Physiology^#gephebase-summary-title)</p> <p>Xenobiotic resistance (insecticide) (https://www.gephebase.org/search-criteria?/and+Trait=~Xenobiotic+resistance+(insecticide)^#gephebase-summary-title)</p> <p>Myzus persicae - sensitive</p> <p>Myzus persicae- resistant</p> <p>Taxon A</p> <p>Intraspecific (https://www.gephebase.org/search-criteria?/and+Taxonomic+Status=~Intraspecific^#gephebase-summary-title)</p>	<p>Trait Category</p> <p>Trait</p> <p>Trait State in Taxon A</p> <p>Trait State in Taxon B</p> <p>Ancestral State</p> <p>Taxonomic Status</p>	<p>Physiology</p> <p>Xenobiotic resistance (insecticide)</p> <p>Myzus persicae - sensitive</p> <p>Myzus persicae- resistant</p> <p>Taxon A</p> <p>Intraspecific</p>
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Taxon A	Latin Name	Taxon B	Latin Name
Myzus persicae (https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=~Myzus+persicae^#gephebase-summary-title)			
green peach aphid	green peach aphid	green peach aphid	green peach aphid
Myzus (Nectarosiphon) persicae; green peach aphid; peach-potato aphid; Myzus persicae (Sulzer, 1776); Myzus persiceae	Myzus (Nectarosiphon) persicae; green peach aphid; peach-potato aphid; Myzus persicae (Sulzer, 1776); Myzus persiceae	Myzus (Nectarosiphon) persicae; green peach aphid; peach-potato aphid; Myzus persicae (Sulzer, 1776); Myzus persiceae	Myzus (Nectarosiphon) persicae; green peach aphid; peach-potato aphid; Myzus persicae (Sulzer, 1776); Myzus persiceae
species	species	species	species
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	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	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	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
Myzus () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=13163)	Myzus () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=13163)	Myzus () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=13163)	Myzus () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=13163)
13164 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=13164)			
No	is Taxon A an Infrappecies?	No	is Taxon B an Infrappecies?

GENOTYPIC CHANGE

<p>-</p> <p>-</p> <p>-</p> <p>Belongs to the type-B carboxylesterase/lipase family.</p> <p>GO:0052689 : carboxylic ester hydrolase activity (https://www.ebi.ac.uk/QuickGO/term/GO:0052689)</p> <p>-</p> <p>-</p> <p>No (https://www.gephebase.org/search-criteria?/and+Presumptive+Null=~No^#gephebase-summary-title)</p>	<p>Generic Gene Name</p> <p>Synonyms</p> <p>String</p> <p>Sequence Similarities</p> <p>GO - Molecular Function</p> <p>GO - Biological Process</p> <p>GO - Cellular Component</p>	<p>P35501 (http://www.uniprot.org/uniprot/P35501)</p> <p>X74554 (https://www.ncbi.nlm.nih.gov/nuccore/X74554)</p> <p>UniProtKB Myzus persicae</p> <p>GenebankID or UniProtKB</p> <p>Presumptive Null</p>
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Gene Amplification (<https://www.gephebase.org/search-criteria?/and+Molecular+Type=^Gene+Amplification^#gephebase-summary-title>)

Molecular Type

Complex Change (<https://www.gephebase.org/search-criteria?/and+Aberration+Type=^Complex+Change^#gephebase-summary-title>)

Aberration Type

Whole gene amplification. Amplification of the E4 gene is closely linked to a chromosomal translocation (the autosomal 1-3 translocation event) and amplified genes are situated at a single heterozygous site on autosome 3 as a tandem array of head-to-tail amplicons.

Molecular Details of the Mutation

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

Experimental Evidence

Molecular evidence that insecticide resistance in peach-potato aphids (*Myzus persicae* Sulz.) results from amplification of an esterase gene. (1988) (<https://pubmed.ncbi.nlm.nih.gov/3390158>)

Main Reference

Authors

Field LM; Devonshire AL; Forde BG

Abstract

cDNA clones for the esterase (E4) responsible for broad insecticide resistance in peach-potato aphids (*Myzus persicae* Sulz.) were isolated and used to study the molecular basis of resistance. Increased esterase synthesis by resistant aphids was found to be associated with amplification of the structural gene for the esterase (E4 or its closely related variant, FE4), the degree of amplification being correlated with the activity of the esterase and the level of resistance. Hybridization of the cDNA clones to genomic Southern blots showed that only some of the esterase-related restriction fragments are amplified. Qualitative differences between restriction patterns in different clones of resistant aphids correlated with the presence or absence of a specific chromosome translocation and with production of E4 or FE4.

Additional References

Relationship between amount of esterase and gene copy number in insecticide-resistant *Myzus persicae* (Sulzer). (1999) (<https://pubmed.ncbi.nlm.nih.gov/10215614>)

The evolution of insecticide resistance in the peach potato aphid, *Myzus persicae*. (2014) (<https://pubmed.ncbi.nlm.nih.gov/24855024>)

RELATED GEPHE

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

Related Genes

No matches found.

Related Haplotypes

EXTERNAL LINKS

COMMENTS

The esterase E4 gene can be found in different copy numbers and at different sites around the genome. Epimutation - Resistance resulting from amplified E4 genes can be unstable with "revertant" clones displaying a sudden loss of both esterase gene expression and insecticide resistance within a single generation. In revertants the large reduction in expression is associated with the loss of 5-methylcytosine (5mC) present in CpG doublets within the E4 genes. This results in gene silencing via demethylation.