

GEPHE SUMMARY

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

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		Taxon B
	Latin Name		Latin Name
Myzus persicae (https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=~Myzus+persicae^#gephebase-summary-title)		Myzus persicae (https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=~Myzus+persicae^#gephebase-summary-title)	
	Common Name		Common Name
green peach aphid		green peach aphid	
	Synonyms		Synonyms
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	
	Rank		Rank
species		species	
	Lineage		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		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		Parent
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)	
	NCBI Taxonomy ID		NCBI Taxonomy ID
13164 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=13164)		13164 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=13164)	
	is Taxon A an Intraspecies?		is Taxon B an Intraspecies?
No		No	

GENOTYPIC CHANGE

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

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 (<i>Myzus persicae</i> Sulz.) results from amplification of an esterase gene. (1988) (https://pubmed.ncbi.nlm.nih.gov/3390158)	Main Reference
Field LM; Devonshire AL; Forde BG	Authors
cDNA clones for the esterase (E4) responsible for broad insecticide resistance in peach-potato aphids (<i>Myzus persicae</i> 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.	Abstract
Relationship between amount of esterase and gene copy number in insecticide-resistant <i>Myzus persicae</i> (Sulzer). (1999) (https://pubmed.ncbi.nlm.nih.gov/10215614) The evolution of insecticide resistance in the peach potato aphid, <i>Myzus persicae</i> . (2014) (https://pubmed.ncbi.nlm.nih.gov/24855024)	Additional References

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.	
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