

GEPHE SUMMARY

	Gephebase Gene		GepheID
Acetylcholinesterase (Ace-2) (https://www.gephebase.org/search-criteria?/and+Gene)		GP00002579	
Gephebase= [^] Acetylcholinesterase (Ace-2) [^] #gephebase-summary-title			Main curator
Published	Entry Status	Courtier	

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)			
criteria= [^] Xenobiotic resistance (insecticide) [^] #gephebase-summary-title			
	Trait State in Taxon A		
Leptinotarsa decemlineata - sensitive			
	Trait State in Taxon B		
Leptinotarsa decemlineata - 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
Leptinotarsa decemlineata		Leptinotarsa decemlineata	
(https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms= [^] Leptinotarsa decemlineata [^] #gephebase-summary-title)		(https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms= [^] Leptinotarsa decemlineata [^] #gephebase-summary-title)	
	Common Name		Common Name
Colorado potato beetle		Colorado potato beetle	
	Synonyms		Synonyms
Leptinotarsa decemlineata; Stilodes decemlineata; Colorado potato beetle; Leptinotarsa decemlineata (Say, 1824)		Leptinotarsa decemlineata; Stilodes decemlineata; Colorado potato beetle; Leptinotarsa decemlineata (Say, 1824)	
	Rank		Rank
species		species	
	Lineage		Lineage
cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Protostomia; Ecdysozoa; Panarthropoda; Arthropoda; Mandibulata; Pancrustacea; Hexapoda; Insecta; Dicondylia; Pterygota; Neoptera; Holometabola; Coleoptera; Polyphaga; Cucujiformia; Chrysomeloidea; Chrysomelidae; Chrysomelinae; Doryphorini; Leptinotarsa		cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Protostomia; Ecdysozoa; Panarthropoda; Arthropoda; Mandibulata; Pancrustacea; Hexapoda; Insecta; Dicondylia; Pterygota; Neoptera; Holometabola; Coleoptera; Polyphaga; Cucujiformia; Chrysomeloidea; Chrysomelidae; Chrysomelinae; Doryphorini; Leptinotarsa	
	Parent		Parent
Leptinotarsa () - (Rank: genus)		Leptinotarsa () - (Rank: genus)	
(https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=7538)		(https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=7538)	
	NCBI Taxonomy ID		NCBI Taxonomy ID
7539		7539	
(https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=7539)		(https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=7539)	
	is Taxon A an Intraspecies?		is Taxon B an Intraspecies?
No		No	

GENOTYPIC CHANGE

	Generic Gene Name		UniProtKB Drosophila melanogaster
Ace		P07140 (http://www.uniprot.org/uniprot/P07140)	
	Synonyms		GenebankID or UniProtKB
AcChE; ace; ACE; ace-2; ache; AchE; AChE; CG17907; CHE; dAChE; dmAChE; DmAChE; Dmel\CG17907; Dm_ace; FBgn0000024; l(3)26; l(3)87Ed		()	
	String		
7227.FBpp0289713			
(http://string-db.org/newstring.cgi/show_network_section.pl?identifier=7227.FBpp0289713)			
	Sequence Similarities		
Belongs to the type-B carboxylesterase/lipase family.			
	GO - Molecular Function		
GO:0042803 : protein homodimerization activity			
(https://www.ebi.ac.uk/QuickGO/term/GO:0042803)			
GO:0003990 : acetylcholinesterase activity			
(https://www.ebi.ac.uk/QuickGO/term/GO:0003990)			
GO:0004104 : cholinesterase activity (https://www.ebi.ac.uk/QuickGO/term/GO:0004104)			

GO:0043199 : sulfate binding (<https://www.ebi.ac.uk/QuickGO/term/GO:0043199>)
GO - Biological Process

GO:0006581 : acetylcholine catabolic process
(<https://www.ebi.ac.uk/QuickGO/term/GO:0006581>)
GO:0001507 : acetylcholine catabolic process in synaptic cleft
(<https://www.ebi.ac.uk/QuickGO/term/GO:0001507>)
GO:0007268 : chemical synaptic transmission
(<https://www.ebi.ac.uk/QuickGO/term/GO:0007268>)
GO:0042426 : choline catabolic process
(<https://www.ebi.ac.uk/QuickGO/term/GO:0042426>)
GO:0042331 : phototaxis (<https://www.ebi.ac.uk/QuickGO/term/GO:0042331>)

GO - Cellular Component

GO:0005886 : plasma membrane (<https://www.ebi.ac.uk/QuickGO/term/GO:0005886>)
GO:0005737 : cytoplasm (<https://www.ebi.ac.uk/QuickGO/term/GO:0005737>)
GO:0031225 : anchored component of membrane
(<https://www.ebi.ac.uk/QuickGO/term/GO:0031225>)
GO:0030054 : cell junction (<https://www.ebi.ac.uk/QuickGO/term/GO:0030054>)
GO:0043083 : synaptic cleft (<https://www.ebi.ac.uk/QuickGO/term/GO:0043083>)

No (<https://www.gephebase.org/search-criteria?/and+Presumptive+Null=~No~#gephebase-summary-title>)

Presumptive Null

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

Molecular Type

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

Aberration Type

Nonsynonymous

SNP Coding Change

S238G

Molecular Details of the Mutation

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

Experimental Evidence

	Taxon A	Taxon B	Position
Codon	-	-	-
Amino-acid	Ser	Gly	328

A Point Mutation of Acetylcholinesterase Associated with Azinphosmethyl Resistance and Reduced Fitness in Colorado Potato Beetle. (1996) (<https://pubmed.ncbi.nlm.nih.gov/8980034>)

Main Reference

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Authors

Abstract

A serine to glycine point mutation of acetylcholinesterase (AChE, EC 1.1.1.7) was identified in an azinphosmethyl-resistant strain of Colorado potato beetle [*Leptinotarsa decemlineata* (Say)]. The position of the mutation corresponds to Val 238 of the Torpedo AChE and represents the first amino acid residue to form the alpha-helix, alpha-E'1. The predicted secondary structure of the mutation-containing region of AChE suggested that the transition from the turn to the alpha-helix occurs sooner in the sequence when serine is replaced by glycine. Thus, conformational changes in the AChE due to the alpha-helix deformation were expected to impinge upon both the catalytic and the peripheral binding sites, resulting in the modification of the bindings of organophosphorus insecticides and other ligands to these sites. The mutation appeared to be associated with the fitness of the beetle. The intrinsic rate of increase of the azinphosmethyl-resistant (AZ-R) strain was relatively low when the beetles were reared on the Russet Burbank potato cultivar, but was relatively high when they were reared on the NDA 1725-1 potato cultivar. Because these two potato cultivars contain different amounts of steroidal glycoalkaloids (e.g., alpha-solanine and alpha-chaconine), the different fitness of the AZ-R strain on different potato cultivars may be partially attributed to the increased sensitivity of the azinphosmethyl-resistant form of AChE to the inhibition by alpha-solanine and reduced sensitivity to alpha-chaconine as previously reported.

Additional References

Genotype to phenotype, the molecular and physiological dimensions of resistance in arthropods. (2015) (<https://pubmed.ncbi.nlm.nih.gov/26047113>)

RELATED GEPHE

2 (Acetylcholinesterase (Ace), para (kdi)) (<https://www.gephebase.org/search-criteria?/or+Taxon+ID=~7539~/and+Trait=Xenobiotic+resistance/and+groupHaplotypes=true#gephebase-summary-title>)

Related Genes

No matches found.

Related Haplotypes

EXTERNAL LINKS

COMMENTS

