

## GEPHE SUMMARY

	Gephebase Gene		GepheID
Acetylcholinesterase (Ace-1) ( <a href="https://www.gephebase.org/search-criteria?/and+Gene">https://www.gephebase.org/search-criteria?/and+Gene</a> )		GP00002577	
Gephebase="Acetylcholinesterase (Ace-1)"#gephebase-summary-title)			Main curator
Published	Entry Status	Courtier	

## PHENOTYPIC CHANGE

	Trait Category
Physiology ( <a href="https://www.gephebase.org/search-criteria?/and+Trait">https://www.gephebase.org/search-criteria?/and+Trait</a> )	
Category="Physiology"#gephebase-summary-title)	Trait
Xenobiotic resistance (insecticide) ( <a #gephebase-summary-title"="" href="https://www.gephebase.org/search-criteria?/and+Trait=Xenobiotic+resistance+(insecticide)">https://www.gephebase.org/search-criteria?/and+Trait=Xenobiotic+resistance+(insecticide)"#gephebase-summary-title</a> )	
	Trait State in Taxon A
Aphis gossypii - sensitive	
	Trait State in Taxon B
Aphis gossypii - resistant	
	Ancestral State
Data not curated	
	Taxonomic Status
Intraspecific ( <a href="https://www.gephebase.org/search-criteria?/and+Taxonomic">https://www.gephebase.org/search-criteria?/and+Taxonomic</a> )	
Status="Intraspecific"#gephebase-summary-title)	

Taxon A	Latin Name	Taxon B	Latin Name
Aphis gossypii		Aphis gossypii	
( <a #gephebase-summary-title"="" href="https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=Aphis+gossypii">https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=Aphis+gossypii"#gephebase-summary-title</a> )		( <a #gephebase-summary-title"="" href="https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=Aphis+gossypii">https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=Aphis+gossypii"#gephebase-summary-title</a> )	
	Common Name		Common Name
cotton aphid		cotton aphid	
	Synonyms		Synonyms
cotton aphid; melon aphid; Aphis gossypii Glover, 1877; Aphis gossypii		cotton aphid; melon aphid; Aphis gossypii Glover, 1877; Aphis gossypii	
	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; Aphidini; Aphis; Aphis		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; Aphidini; Aphis; Aphis	
	Parent		Parent
Aphis () - (Rank: subgenus)		Aphis () - (Rank: subgenus)	
( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=464929">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=464929</a> )		( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=464929">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=464929</a> )	
	NCBI Taxonomy ID		NCBI Taxonomy ID
80765		80765	
( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=80765">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=80765</a> )		( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=80765">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=80765</a> )	
	is Taxon A an Intraspecies?		is Taxon B an Intraspecies?
No		No	

## GENOTYPIC CHANGE

	Generic Gene Name		UniProtKB Drosophila melanogaster
Ace		P07140 ( <a href="http://www.uniprot.org/uniprot/P07140">http://www.uniprot.org/uniprot/P07140</a> )	
	Synonyms		GenebankID or UniProtKB
AcChE; ace; ACE; ace-2; ache; AchE; AchE; CG17907; CHE; dAcChE; dmAcChE; DmAcChE; Dmel\CG17907; Dm_ace; FBgn0000024; l(3)26; l(3)87Ed		ALE67001 ( <a href="https://www.ncbi.nlm.nih.gov/nuccore/ALE67001">https://www.ncbi.nlm.nih.gov/nuccore/ALE67001</a> )	
	String		
7227.FBpp0289713			
( <a href="http://string-db.org/newstring.cgi/show_network_section.pl?identifier=7227.FBpp0289713">http://string-db.org/newstring.cgi/show_network_section.pl?identifier=7227.FBpp0289713</a> )			
	Sequence Similarities		
Belongs to the type-B carboxylesterase/lipase family.			
	GO - Molecular Function		
GO:0042803 : protein homodimerization activity			
( <a href="https://www.ebi.ac.uk/QuickGO/term/GO:0042803">https://www.ebi.ac.uk/QuickGO/term/GO:0042803</a> )			
GO:0003990 : acetylcholinesterase activity			
( <a href="https://www.ebi.ac.uk/QuickGO/term/GO:0003990">https://www.ebi.ac.uk/QuickGO/term/GO:0003990</a> )			
GO:0004104 : cholinesterase activity ( <a href="https://www.ebi.ac.uk/QuickGO/term/GO:0004104">https://www.ebi.ac.uk/QuickGO/term/GO:0004104</a> )			
GO:0043199 : sulfate binding ( <a href="https://www.ebi.ac.uk/QuickGO/term/GO:0043199">https://www.ebi.ac.uk/QuickGO/term/GO:0043199</a> )			

- 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>)

Presumptive Null

No ([https://www.gephebase.org/search-criteria?/and+Presumptive Null=^No^#gephebase-summary-title](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](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](https://www.gephebase.org/search-criteria?/and+Aberration+Type=^SNP^#gephebase-summary-title))

SNP Coding Change

Nonsynonymous

Molecular Details of the Mutation

A201S

Experimental Evidence

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

	Taxon A	Taxon B	Position
Codon	-	-	-
Amino-acid	Ser	Phe	431

Main Reference

Mutations in acetylcholinesterase associated with insecticide resistance in the cotton aphid, *Aphis gossypii* Glover. (2004) (<https://pubmed.ncbi.nlm.nih.gov/15041023>)

Authors

Li F; Han Z

Abstract

Two acetylcholinesterase genes, *Ace1* and *Ace2*, have been fully cloned and sequenced from both organophosphate-resistant and susceptible clones of cotton aphid. Comparison of both nucleic acid and deduced amino acid sequences revealed considerable nucleotide polymorphisms. Further study found that two mutations occurred consistently in all resistant aphids. The mutation F139L in *Ace2* corresponding to F115S in *Drosophila* acetylcholinesterase might reduce the enzyme sensitivity and result in insecticide resistance. The other mutation A302S in *Ace1* abutting the conserved catalytic triad might affect the activity and insecticide sensitivity of the enzyme. Phylogenetic analysis showed that insect acetylcholinesterases fall into two subgroups, of which *Ace1* is the paralogous gene whereas *Ace2* is the orthologous gene of *Drosophila* AChE. Both subgroups contain resistance-associated AChE genes. To avoid confusion in the future work, a nomenclature of insect AChE is also suggested in the paper.

Additional References

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

Identification of mutations conferring insecticide-insensitive AChE in the cotton-melon aphid, *Aphis gossypii* Glover. (2004) (<https://pubmed.ncbi.nlm.nih.gov/15373812>)

Two amino acid substitutions in acetylcholinesterase associated with pirimicarb and organophosphorous insecticide resistance in the cotton aphid, *Aphis gossypii* Glover (Homoptera: Aphididae). (2004) (<https://pubmed.ncbi.nlm.nih.gov/15373811>)

RELATED GEPHE

Related Genes

3 (Acetylcholinesterase (Ace-2), nAChR, para (kdr)) ([https://www.gephebase.org/search-criteria?/or+Taxon ID=^80765^/and+Trait=Xenobiotic resistance/and+groupHaplotypes=true#gephebase-summary-title](https://www.gephebase.org/search-criteria?/or+Taxon+ID=^80765^/and+Trait=Xenobiotic+resistance/and+groupHaplotypes=true#gephebase-summary-title))

Related Haplotypes

1 ([https://www.gephebase.org/search-criteria?/or+Gene Gephebase=^Acetylcholinesterase \(Ace-1\)^/and+Taxon ID=^80765^/or+Gene Gephebase=^Acetylcholinesterase \(Ace-1\)^/and+Taxon ID=^80765^#gephebase-summary-title](https://www.gephebase.org/search-criteria?/or+Gene+Gephebase=^Acetylcholinesterase+(Ace-1)^/and+Taxon+ID=^80765^/or+Gene+Gephebase=^Acetylcholinesterase+(Ace-1)^/and+Taxon+ID=^80765^#gephebase-summary-title))

EXTERNAL LINKS

COMMENTS

