

GEPHE SUMMARY

	Gephebase Gene		GepheID
Acetylcholinesterase (Ace-1) (https://www.gephebase.org/search-criteria?/and+Gene)		GP00000026	
Gephebase= [^] Acetylcholinesterase (Ace-1) [^] #gephebase-summary-title			Main curator
Published	Entry Status	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)		
criteria= [^] Xenobiotic resistance (insecticide) [^] #gephebase-summary-title	Trait State in Taxon A	
Anopheles albimanus -sensitive		
	Trait State in Taxon B	
Anopheles albimanus - 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	Taxon B	Latin Name
Anopheles albimanus (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms= [^] Anopheles albimanus [^] #gephebase-summary-title)		Anopheles albimanus (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms= [^] Anopheles albimanus [^] #gephebase-summary-title)	
-	Common Name	-	Common Name
-	Synonyms	-	Synonyms
-	Rank	-	Rank
species		species	
cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Protostomia; Ecdysozoa; Panarthropoda; Arthropoda; Mandibulata; Pancrustacea; Hexapoda; Insecta; Dicondylia; Pterygota; Neoptera; Holometabola; Diptera; Nematocera; Culicomorpha; Culicoidea; Culicidae; Anophelinae; Anopheles; Nyssorhynchus; albimanus section; albimanus series	Lineage	cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Protostomia; Ecdysozoa; Panarthropoda; Arthropoda; Mandibulata; Pancrustacea; Hexapoda; Insecta; Dicondylia; Pterygota; Neoptera; Holometabola; Diptera; Nematocera; Culicomorpha; Culicoidea; Culicidae; Anophelinae; Anopheles; Nyssorhynchus; albimanus section; albimanus series	Lineage
albimanus series () - (Rank: no rank) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=44547)	Parent	albimanus series () - (Rank: no rank) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=44547)	Parent
7167 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=7167)	NCBI Taxonomy ID	7167 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=7167)	NCBI Taxonomy ID
No	is Taxon A an Intraspecies?	No	is Taxon B an Intraspecies?

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; I(3)26; I(3)87Ed		CAD27456 (https://www.ncbi.nlm.nih.gov/nuccore/CAD27456)
	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](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](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](https://www.gephebase.org/search-criteria?/and+Aberration+Type=~SNP~#gephebase-summary-title))

Aberration Type

Nonsynonymous

SNP Coding Change

G119S

Molecular Details of the Mutation

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))

Experimental Evidence

	Taxon A	Taxon B	Position
Codon	-	-	-
Amino-acid	-	-	-

The unique mutation in ace-1 giving high insecticide resistance is easily detectable in mosquito vectors. (2004) (<https://pubmed.ncbi.nlm.nih.gov/14728661>)

Main Reference

Weill M; Malcolm C; Chandre F; Mogensen K; Berthomieu A; Marquine M; Raymond M

Authors

High insecticide resistance resulting from insensitive acetylcholinesterase (AChE) has emerged in mosquitoes. A single mutation (G119S of the ace-1 gene) explains this high resistance in *Culex pipiens* and in *Anopheles gambiae*. In order to provide better documentation of the ace-1 gene and the effect of the G119S mutation, we present a three-dimension structure model of AChE, showing that this unique substitution is localized in the oxyanion hole, explaining the insecticide insensitivity and its interference with the enzyme catalytic functions. As the G119S creates a restriction site, a simple PCR test was devised to detect its presence in both *A. gambiae* and *C. pipiens*, two mosquito species belonging to different subfamilies (Culicinae and Anophelinae). It is possible that this mutation also explains the high resistance found in other mosquitoes, and the present results indicate that the PCR test detects the G119S mutation in the malaria vector *A. albimanus*. The G119S has thus occurred independently at least four times in mosquitoes and this PCR test is probably of broad applicability within the Culicidae family.

Abstract

Additional References

RELATED GEPHE

No matches found.

Related Genes

No matches found.

Related Haplotypes

EXTERNAL LINKS

COMMENTS

