

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) (<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) | | |
| | 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 (<a #gephebase-summary-title"="" href="https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=Anopheles+albimanus">https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=Anopheles+albimanus"#gephebase-summary-title) | | Anopheles albimanus (<a #gephebase-summary-title"="" href="https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=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>)

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

G119S

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 | - | - | - |

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

1 (para (kdr)) (<https://www.gephebase.org/search-criteria?/or+Taxon+ID=~7167^/and+Trait=Xenobiotic+resistance/and+groupHaplotypes=true#gephebase-summary-title>)

Related Genes

No matches found.

Related Haplotypes

EXTERNAL LINKS

COMMENTS

