

GEPHE SUMMARY

Gephebase Gene
Acetylcholinesterase (Ace-1)

Entry Status
Published

GepheID
GP00000031

Main curator
Martin

PHENOTYPIC CHANGE

Trait Category
Physiology

Trait
Xenobiotic resistance (insecticide)

Trait State in Taxon A
Culex vishnui - sensitive

Trait State in Taxon B
Culex vishnui - resistant

Ancestral State
Taxon A

Taxonomic Status
Intraspecific

Taxon A

Latin Name
Culex vishnui

Common Name
-

Synonyms
Culex vishnui Theobald, 1901

Rank
species

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; Culicinae; Culicini; Culex; Culex

Parent
Culex () - (Rank: subgenus)

NCBI Taxonomy ID
100678

is Taxon A an Intraspecies?
No

Taxon B

Latin Name
Culex vishnui

Common Name
-

Synonyms
Culex vishnui Theobald, 1901

Rank
species

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; Culicinae; Culicini; Culex; Culex

Parent
Culex () - (Rank: subgenus)

NCBI Taxonomy ID
100678

is Taxon B an Intraspecies?
No

GENOTYPIC CHANGE

Generic Gene Name
Ace

Synonyms
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

Sequence Similarities
Belongs to the type-B carboxylesterase/lipase family.

GO - Molecular Function
GO:0042803 : protein homodimerization activity
GO:0003990 : acetylcholinesterase activity
GO:0004104 : cholinesterase activity
GO:0043199 : sulfate binding

GO - Biological Process
GO:0006581 : acetylcholine catabolic process
GO:0001507 : acetylcholine catabolic process in synaptic cleft
GO:0007268 : chemical synaptic transmission
GO:0042426 : choline catabolic process

UniProtKB Drosophila melanogaster
P07140

GenebankID or UniProtKB
EDS26232

GO:0042331 : phototaxis

GO - Cellular Component

GO:0005886 : plasma membrane

GO:0005737 : cytoplasm

GO:0031225 : anchored component of membrane

GO:0030054 : cell junction

GO:0043083 : synaptic cleft

Presumptive Null

No

Molecular Type

Coding

Aberration Type

SNP

SNP Coding Change

Nonsynonymous

Molecular Details of the Mutation

G119S

Experimental Evidence

Candidate Gene

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

Main Reference

Different amino-acid substitutions confer insecticide resistance through acetylcholinesterase 1 insensitivity in *Culex vishnui* and *Culex tritaeniorhynchus* (Diptera: Culicidae) from China. (2007)

Authors

Alout H; Berthomieu A; Cui F; Tan Y; Berticat C; Qiao C; Weill M

Abstract

Insecticide resistance owing to insensitive acetylcholinesterase (AChE)1 has been reported in several mosquito species, and only two mutations in the ace-1 gene have been implicated in resistance: 119S and 331W substitutions. We analyzed the AChE1 resistance status of *Culex vishnui* (Theobald) and *Culex tritaeniorhynchus* Giles sampled in various regions of China. These two species displayed distinct mutations leading to AChE1 insensitivity: the 119S substitution in resistant *C. vishnui* mosquitoes and the 331W substitution in resistant *C. tritaeniorhynchus*. A biochemical test was validated to detect the 331W mutation in field samples. The comparison of the recombinant G119S and 331W mutant proteins produced in vitro with the AChE1 extracted from resistant mosquitoes indicated that the AChE1 insensitivity observed could be specifically attributed to these substitutions. Comparison of their biochemical characteristics indicated that the resistance conferred by these mutations depends on the insecticide used, regardless of its class. This resistance seemed to be fixed in the *Cx. tritaeniorhynchus* populations sampled in a 2000-km transect, suggesting a very high level of insecticide application or a low fitness cost associated with this 331W mutation.

Additional References

RELATED GEPHE

Related Genes

No matches found.

Related Haplotypes

No matches found.

EXTERNAL LINKS

COMMENTS