GEPHE SUMMARY

Gephebase Gene
esterase B1 = esterase beta1 (https://www.gephebase.org/search-criteria?/and+Gene Gephebase=^esterase B1 = esterase beta1^#gephebase-summary-title)

GepheID
GP00000292

Entry Status
Published

Main curator
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=^Xenobiotic resistance (insecticide)^#gephebase-summary-title)

Trait State in Taxon A
Culex pipiens quinquefasciatus - sensitive S-LAB

Trait State in Taxon B
Culex pipiens quinquefasciatus- resistant Tem-R

Ancestral State
Taxon A

Taxonomic Status
Intraspecific (https://www.gephebase.org/search-criteria?/and+Taxonomic Status=^Intraspecific^#gephebase-summary-title)

Taxon A

Latin Name
Culex quinquefasciatus (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=^Culex quinquefasciatus^#gephebase-summary-title)

Common Name
southern house mosquito

Synonyms
Culex fatigans; Culex pipiens fatigans; Culex pipiens quinquefasciatus; southern house mosquito; Culex fatigan; Culex pipiens quiquefasciatus; Culex quinquifasciatus; Culex quinquifasiatus; Culex quiquefasciatus

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; Culex pipiens complex

Parent
Culex pipiens complex () - (Rank: no rank) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 518105)

NCBI Taxonomy ID
7176 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 7176)

is Taxon A an Infraspecies?
Yes

Taxon A Description
Culex pipiens quinquefasciatus - sensitive S-LAB

Taxon B

Latin Name
Culex quinquefasciatus (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=^Culex quinquefasciatus^#gephebase-summary-title)

Common Name
southern house mosquito

Synonyms
Culex fatigans; Culex pipiens fatigans; Culex pipiens quinquefasciatus; southern house mosquito; Culex fatigan; Culex pipiens quiquefasciatus; Culex quinquifasciatus; Culex quinquifasiatus; Culex quiquefasciatus

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; Culex pipiens complex

Parent
Culex pipiens complex () - (Rank: no rank) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 518105)

NCBI Taxonomy ID
7176 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 7176)

is Taxon B an Infraspecies?
Yes

Taxon B Description
Culex pipiens quinquefasciatus- resistant Tem-R

GENOTYPIC CHANGE

Generic Gene Name
B1

Synonyms
-

String
-

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

GO - Molecular Function
GO:0052689 : carboxylic ester hydrolase activity (https://www.ebi.ac.uk/QuickGO/term/GO:0052689)

GO - Biological Process
-

GO - Cellular Component

UniProtKB Culex pipiens
P16854 (http://www.uniprot.org/uniprot/P16854)

GenebankID or UniProtKB
CP001129 (https://www.ncbi.nlm.nih.gov/nuccore/CP001129)

-

Presumptive Null

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

Molecular Type

Gene Amplification (https://www.gephebase.org/search-criteria?/and+Molecular Type=^Gene Amplification^#gephebase-summary-title)

Aberration Type

Complex Change (https://www.gephebase.org/search-criteria?/and+Aberration Type=^Complex Change^#gephebase-summary-title)

Molecular Details of the Mutation

Amplification of esterase B1 only

Experimental Evidence

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

Main Reference

Amplification of an esterase gene is responsible for insecticide resistance in a California Culex mosquito. (1986) (https://pubmed.ncbi.nlm.nih.gov/3755546)

Authors

MouchÃ¨s C; Pasteur N; BergÃ© JB; Hyrien O; Raymond M; de Saint Vincent BR; de Silvestri M; Georghiou GP

Abstract

An esterase gene from the mosquito Culex quinquefasciatus that is responsible for resistance to a variety of organophosphorus (OP) insecticides was cloned in lambda gt11 phage. This gene was used to investigate the genetic mechanism of the high production of the esterase B1 it encodes in OP-resistant Culex quinquefasciatus Say (Tem-R strain) from California. Adults of the Tem-R strain were found to possess at least 250 times more copies of the gene than adults of a susceptible strain (S-Lab). The finding that selection by pesticides may result in the amplification of genes encoding detoxifying enzymes in whole, normally developed, reproducing insects emphasizes the biological importance of this mechanism and opens new areas of investigation in pesticide resistance management.

Additional References

Quantitative variation and selection of esterase gene amplification in Culex pipiens. (1999) (https://pubmed.ncbi.nlm.nih.gov/10447707)
Characterization of amplification core and esterase B1 gene responsible for insecticide resistance in Culex. (1990) (https://pubmed.ncbi.nlm.nih.gov/2320576)
Testing the unique amplification event and the worldwide migration hypothesis of insecticide resistance genes with sequence data. (1996) (https://pubmed.ncbi.nlm.nih.gov/8939020)

RELATED GEPHE

Related Genes

4 (Cpm1, esterase B1 + esterase A, para (kdr), resistance to dieldrin) (https://www.gephebase.org/search-criteria?/or+Taxon ID=^7176^/and+Trait=Xenobiotic resistance/and+groupHaplotypes=true#gephebase-summary-title)

Related Haplotypes

No matches found.

EXTERNAL LINKS

COMMENTS

Cluster of paralogous genes