

GEPHE SUMMARY

	Gephebase Gene	GephelD
Cpm1 (https://www.gephebase.org/search-criteria/?and+Gene Gephebase=^Cpm1">#gephebase-summary-title)	GP00002102	Main curator
	Entry Status	Courtier
Published		

PHENOTYPIC CHANGE

Trait Category
 Physiology (<https://www.gephebase.org/search-criteria/?and+Trait>
Category=^Physiology^#gephebase-summary-title)

Trait

Xenobiotic resistance (insecticide; toxin produced by *Bacillus sphaericus*)
 ([https://www.gephebase.org/search-criteria/?and+Trait=^Xenobiotic+resistance+\(insecticide;](https://www.gephebase.org/search-criteria/?and+Trait=^Xenobiotic+resistance+(insecticide;)
toxin produced by *Bacillus sphaericus*)^#gephebase-summary-title)

Trait State in Taxon A

Culex pipiens - sensitive

Trait State in Taxon B

Culex pipiens fasciatus - resistant - allele cpm1BP

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 pipiens
 (<https://www.gephebase.org/search-criteria/?and+Taxon+and+Synonyms=^Culex>
pieniens^#gephebase-summary-title)

Common Name

northern house mosquito

Synonyms

Culex agilis; *Culex autogenicus*; *Culex azoriensis*; *Culex bicolor*; *Culex bifurcatus*; *Culex calcitrans*; *Culex calloti*; *Culex comitatus*; *Culex consobrinus*; *Culex dipseticus*; *Culex disjunctus*; *Culex doliorum*; *Culex domesticus*; *Culex erectus*; *Culex fasciatus*; *Culex haematosphagus*; *Culex longefurcatus*; *Culex luteus*; *Culex marginalis*; *Culex melanorhinus*; *Culex meridionalis*; *Culex osakaensis*; *Culex pallipes*; *Culex phytophagus*; *Culex quasimodestus*; *Culex rufinus*; *Culex rufus*; *Culex sternopunctatus*; *Culex thoracicus*; *Culex torridus*; *Culex trifurcatus*; *Culex unistriatus*; *Culex varioannulatus*; northern house mosquito; *Culex pipiens* Linnaeus, 1758

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

7175

(<https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 7175>)

is Taxon A an Infraspecies?

No

Taxon B

Latin Name

Culex pipiens
 (<https://www.gephebase.org/search-criteria/?and+Taxon+and+Synonyms=^Culex>
pieniens^#gephebase-summary-title)

Common Name

northern house mosquito

Synonyms

Culex agilis; *Culex autogenicus*; *Culex azoriensis*; *Culex bicolor*; *Culex bifurcatus*; *Culex calcitrans*; *Culex calloti*; *Culex comitatus*; *Culex consobrinus*; *Culex dipseticus*; *Culex disjunctus*; *Culex doliorum*; *Culex domesticus*; *Culex erectus*; *Culex fasciatus*; *Culex haematosphagus*; *Culex longefurcatus*; *Culex luteus*; *Culex marginalis*; *Culex melanorhinus*; *Culex meridionalis*; *Culex osakaensis*; *Culex pallipes*; *Culex phytophagus*; *Culex quasimodestus*; *Culex rufinus*; *Culex rufus*; *Culex sternopunctatus*; *Culex thoracicus*; *Culex torridus*; *Culex trifurcatus*; *Culex unistriatus*; *Culex varioannulatus*; northern house mosquito; *Culex pipiens* Linnaeus, 1758

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

7175

(<https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 7175>)

is Taxon B an Infraspecies?

No

GENOTYPIC CHANGE

Generic Gene Name

UniProtKB

- Q95WY5 (<http://www.uniprot.org/uniprot/Q95WY5>)

GenebankID or UniProtKB

- Q95WY5 (<https://www.ncbi.nlm.nih.gov/nuccore/Q95WY5>)

Synonyms

String

Sequence Similarities

GO - Molecular Function

GO - Biological Process

GO - Cellular Component

Presumptive Null

Yes (<https://www.gephebase.org/search-criteria?/and+Presumptive+Null=%Yes%#gephebase-summary-title>)

Molecular Type

Coding (<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>)

SNP Coding Change

Nonsense

Molecular Details of the Mutation

Gln396Stop - nonsense mutation which causes the loss of the C-terminal domain required for a proper anchoring of the receptor to the cell surface and thus disrupts a crucial step in the toxic properties of *B. sphaericus* toxin.

Experimental Evidence

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

	Taxon A	Taxon B	Position
Codon	-	-	-
Amino-acid	Gln	STP	396

Main Reference

Transposon-mediated resistance to *Bacillus sphaericus* in a field-evolved population of *Culex pipiens* (Diptera: Culicidae). (2007) (<https://pubmed.ncbi.nlm.nih.gov/17394558>)

Authors

Darboux I; Charles JF; Pauchet Y; Warot S; Pauron D

Abstract

The binary toxin is the major active component of *Bacillus sphaericus*, a microbial larvicide used for controlling some vector mosquito-borne diseases. *B. sphaericus* resistance has been reported in many part of the world, leading to a growing concern for the usefulness of this environmental friendly insecticide. Here we characterize a novel mechanism of resistance to the binary toxin in a natural population of the West Nile virus vector, *Culex pipiens*. We show that the insertion of a transposable element-like DNA into the coding sequence of the midgut toxin receptor induces a new mRNA splicing event, unmasking cryptic donor and acceptor sites located in the host gene. The creation of the new intron causes the expression of an altered membrane protein, which is incapable of interacting with the toxin, thus providing the host mosquito with an advantageous phenotype. As a large portion of insect genomes is composed of transposable elements or transposable elements-related sequences, this new mechanism may be of general importance to appreciate their significance as potent agents for insect resistance to the microbial insecticides.

Additional References

RELATED GEPHE

Related Genes

5 (Acetylcholinesterase (Ace-1), esterase A8 and B8, esterase B4, esterase B5, para (kdr)) (<https://www.gephebase.org/search-criteria?/or+Taxon+ID=%7175%and+Trait=Xenobiotic+resistance/and+groupHaplotypes=true#gephebase-summary-title>)

Related Haplotypes

1 (<https://www.gephebase.org/search-criteria?/or+Gene+Gephebase=%Cpm1%and+Taxon+ID=%7175%or+Gene+Gephebase=%Cpm1%and+Taxon+ID=%7175%#gephebase-summary-title>)

EXTERNAL LINKS

COMMENTS