

GEPHE SUMMARY

Cpm1 (https://www.gephebase.org/search-criteria?/and+Gene Gephebase="Cpm1" #gephebase-summary-title)	Gephebase Gene	GP00002103	GepheID
Published	Entry Status	Courtier	Main curator

PHENOTYPIC CHANGE

Physiology (https://www.gephebase.org/search-criteria?/and+Trait Category="Physiology" #gephebase-summary-title)	Trait Category		
Xenobiotic resistance (insecticide; toxin produced by <i>Bacillus sphaericus</i>) (https://www.gephebase.org/search-criteria?/and+Trait="Xenobiotic resistance (insecticide; toxin produced by <i>Bacillus sphaericus</i>)" #gephebase-summary-title)	Trait		
Culex pipiens - sensitive	Trait State in Taxon A		
Culex pipiens fasciatus - resistant - allele cpm1BP-del	Trait State in Taxon B		
Taxon A	Ancestral State		
Intraspecific (https://www.gephebase.org/search-criteria?/and+Taxonomic Status="Intraspecific" #gephebase-summary-title)	Taxonomic Status		
Culex pipiens (<a culex+pipiens""="" href="https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=">https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms="Culex pipiens" #gephebase-summary-title)	Taxon A	Culex pipiens (<a culex+pipiens""="" href="https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=">https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms="Culex pipiens" #gephebase-summary-title)	Taxon B
northern house mosquito	Latin Name	northern house mosquito	Latin Name
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 haematophagus; 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	Common Name	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 haematophagus; 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	Common Name
species	Synonyms	species	Synonyms
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	Rank	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	Rank
Culex pipiens complex () - (Rank: no rank) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=518105)	Lineage	Culex pipiens complex () - (Rank: no rank) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=518105)	Lineage
7175 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=7175)	Parent	7175 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=7175)	Parent
No	is Taxon A an Intraspecies?	No	is Taxon B an Intraspecies?

GENOTYPIC CHANGE

-	Generic Gene Name	Q95WY5 (http://www.uniprot.org/uniprot/Q95WY5)	UniProtKB
-	Synonyms	Q95WY5 (https://www.ncbi.nlm.nih.gov/nuccore/Q95WY5)	GenebankID or UniProtKB
-	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](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](https://www.gephebase.org/search-criteria?/and+Molecular+Type=~Coding^#gephebase-summary-title))

Aberration Type

Insertion ([https://www.gephebase.org/search-criteria?/and+Aberration Type=~Insertion^#gephebase-summary-title](https://www.gephebase.org/search-criteria?/and+Aberration+Type=~Insertion^#gephebase-summary-title))

Insertion Size

1-10 kb

Molecular Details of the Mutation

Insertion of a 451-bp TE into the exon 2 of the toxin receptor gene. The insertion induces a new mRNA splicing event that creates a shorter transcript. This new transcript encodes an altered receptor unable to interact with the toxin resulting in resistance to this insecticide. The missing portion includes GPI-anchoring signals

Experimental Evidence

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))

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

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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

2 (Acetylcholinesterase (Ace-1), para (kdr)) ([https://www.gephebase.org/search-criteria?/or+Taxon ID=~7175^/and+Trait=Xenobiotic resistance/and+groupHaplotypes=true#gephebase-summary-title](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](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

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