

## GEPHE SUMMARY

<p>Cpm1 (<a href="https://www.gephebase.org/search-criteria?/and+Gene">https://www.gephebase.org/search-criteria?/and+Gene</a> Gephebase="Cpm1" #gephebase-summary-title)</p> <p>Published</p>	<p>Gephebase Gene</p> <p>Entry Status</p>	<p>GP00002552</p> <p>Courtier</p>	<p>GepheID</p> <p>Main curator</p>
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## PHENOTYPIC CHANGE

<p>Physiology (<a href="https://www.gephebase.org/search-criteria?/and+Trait">https://www.gephebase.org/search-criteria?/and+Trait</a> Category="Physiology" #gephebase-summary-title)</p> <p>Xenobiotic resistance (insecticide; toxin produced by <i>Bacillus sphaericus</i>) (<a href="https://www.gephebase.org/search-criteria?/and+Trait=" xenobiotic+resistance+(insecticide;+toxin+produced+by+bacillus+sphaericus)""="">https://www.gephebase.org/search-criteria?/and+Trait="Xenobiotic resistance (insecticide; toxin produced by <i>Bacillus sphaericus</i>)" #gephebase-summary-title</a>)</p> <p>Culex quinquefasciatus - sensitive</p> <p>Culex quinquefasciatus - resistant</p> <p>Taxon A</p> <p>Intraspecific (<a href="https://www.gephebase.org/search-criteria?/and+Taxonomic">https://www.gephebase.org/search-criteria?/and+Taxonomic</a> Status="Intraspecific" #gephebase-summary-title)</p>	<p>Trait Category</p> <p>Trait</p> <p>Trait State in Taxon A</p> <p>Trait State in Taxon B</p> <p>Ancestral State</p> <p>Taxonomic Status</p>	<p>Taxon A</p> <p>Latin Name</p> <p>Culex quinquefasciatus (<a culex+quinquefasciatus""="" href="https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=">https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms="Culex quinquefasciatus" #gephebase-summary-title</a>)</p> <p>Common Name</p> <p>southern house mosquito</p> <p>Synonyms</p> <p>Culex fatigans; Culex pipiens fatigans; Culex pipiens quinquefasciatus; southern house mosquito; Culex fatigan; Culex pipiens quinquefasciatus; Culex quinquefasciatus; Culex quinquefasciatus; Culex quinquefasciatus</p> <p>Rank</p> <p>species</p> <p>Lineage</p> <p>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</p> <p>Parent</p> <p>Culex pipiens complex () - (Rank: no rank) (<a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=518105">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=518105</a>)</p> <p>NCBI Taxonomy ID</p> <p>7176 (<a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=7176">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=7176</a>)</p> <p>is Taxon A an Intraspecies?</p> <p>No</p>	<p>Taxon B</p> <p>Latin Name</p> <p>Culex quinquefasciatus (<a culex+quinquefasciatus""="" href="https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=">https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms="Culex quinquefasciatus" #gephebase-summary-title</a>)</p> <p>Common Name</p> <p>southern house mosquito</p> <p>Synonyms</p> <p>Culex fatigans; Culex pipiens fatigans; Culex pipiens quinquefasciatus; southern house mosquito; Culex fatigan; Culex pipiens quinquefasciatus; Culex quinquefasciatus; Culex quinquefasciatus; Culex quinquefasciatus</p> <p>Rank</p> <p>species</p> <p>Lineage</p> <p>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</p> <p>Parent</p> <p>Culex pipiens complex () - (Rank: no rank) (<a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=518105">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=518105</a>)</p> <p>NCBI Taxonomy ID</p> <p>7176 (<a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=7176">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=7176</a>)</p> <p>is Taxon B an Intraspecies?</p> <p>No</p>
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## GENOTYPIC CHANGE

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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

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

Deletion Size

1-9 bp

Molecular Details of the Mutation

one-nucleotide deletion which results in a premature stop codon and leads to production of a truncated protein.

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

Single nucleotide deletion of *cqm1* gene results in the development of resistance to *Bacillus sphaericus* in *Culex quinquefasciatus*. (2013) (<https://pubmed.ncbi.nlm.nih.gov/23871751>)

Authors

Guo QY; Cai QX; Yan JP; Hu XM; Zheng DS; Yuan ZM

Abstract

The entomopathogen *Bacillus sphaericus* is one of the most effective biolarvicides used to control the *Culex* species of mosquito. The appearance of resistance in mosquitoes to this bacterium, however, remains a threat to its continuous use in integrated mosquito control programs. Previous work showed that the resistance to *B. sphaericus* in *Culex* colonies was associated with the absence of the 60-kDa binary toxin receptor (Cpm1/Cqm1), an alpha-glucosidase present in the larval midgut microvilli. In this work, we studied the molecular basis of the resistance developed by *Culex quinquefasciatus* to *B. sphaericus* C3-41. The *cqm1* genes were cloned from susceptible (CqSL) and resistant (CqRL/C3-41) colonies, respectively. The sequence of the cDNA and genomic DNA derived from CqRL/C3-41 colony differed from that of CqSL one by a one-nucleotide deletion which resulted in a premature stop codon, leading to production of a truncated protein. Recombinant Cqm1S from the CqSL colony expressed in *Escherichia coli* specifically bound to the Bin toxin and had  $\beta$ -glucosidase activity, whereas the Cqm1R from the CqRL/C3-41 colony, with a deletion of three quarters of the receptor's C-terminal lost its  $\beta$ -glucosidase activity and could not bind to the binary toxin. Immunoblotting experiments showed that Cqm1 was undetectable in CqRL/C3-41 larvae, although the gene was correctly transcribed. Thus, the *cqm1R* represents a new allele in *C. quinquefasciatus* that confers resistance to *B. sphaericus*.

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Additional References

Loss of the membrane anchor of the target receptor is a mechanism of bioinsecticide resistance. (2002) (<https://pubmed.ncbi.nlm.nih.gov/11983886>)

## RELATED GEPHE

Related Genes

4 (esterase B1 + esterase A, esterase B1 = esterase beta1, 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](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