

GEPHE SUMMARY

ABCC2 ( <a href="https://www.gephebase.org/search-criteria?/and+Gene+Gephebase=^ABCC2^#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Gene+Gephebase=^ABCC2^#gephebase-summary-title</a> )	Gephebase Gene	GP00000011	GepheID
Published	Entry Status	Martin	Main curator

PHENOTYPIC CHANGE

Physiology ( <a href="https://www.gephebase.org/search-criteria?/and+Trait+Category=^Physiology^#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Trait+Category=^Physiology^#gephebase-summary-title</a> )	Trait Category		
Xenobiotic resistance (insecticide) ( <a href="https://www.gephebase.org/search-criteria?/and+Trait=^Xenobiotic+resistance+(insecticide)^#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Trait=^Xenobiotic+resistance+(insecticide)^#gephebase-summary-title</a> )	Trait		
Bombyx mori - Bt susceptible strains	Trait State in Taxon A		
Bombyx mori - Bt resistant strains	Trait State in Taxon B		
Taxon A	Ancestral State		
Domesticated ( <a href="https://www.gephebase.org/search-criteria?/and+Taxonomic+Status=^Domesticated^#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Taxonomic+Status=^Domesticated^#gephebase-summary-title</a> )	Taxonomic Status		
	Taxon A		Taxon B
Bombyx mori ( <a href="https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=^Bombyx+mori^#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=^Bombyx+mori^#gephebase-summary-title</a> )	Latin Name	Bombyx mori ( <a href="https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=^Bombyx+mori^#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=^Bombyx+mori^#gephebase-summary-title</a> )	Latin Name
domestic silkworm	Common Name	domestic silkworm	Common Name
domestic silkworm; silk moth; silkworm; Bombyx mori Linnaeus, 1758	Synonyms	domestic silkworm; silk moth; silkworm; Bombyx mori Linnaeus, 1758	Synonyms
species	Rank	species	Rank
cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Protostomia; Ecdysozoa; Panarthropoda; Arthropoda; Mandibulata; Pancrustacea; Hexapoda; Insecta; Dicondylia; Pterygota; Neoptera; Holometabola; Amphimesnoptera; Lepidoptera; Glossata; Neolepidoptera; Heteroneura; Ditrysia; Obtectomera; Bombycoidea; Bombycidae; Bombycinae; Bombyx	Lineage	cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Protostomia; Ecdysozoa; Panarthropoda; Arthropoda; Mandibulata; Pancrustacea; Hexapoda; Insecta; Dicondylia; Pterygota; Neoptera; Holometabola; Amphimesnoptera; Lepidoptera; Glossata; Neolepidoptera; Heteroneura; Ditrysia; Obtectomera; Bombycoidea; Bombycidae; Bombycinae; Bombyx	Lineage
Bombyx () - (Rank: genus) ( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=7090">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=7090</a> )	Parent	Bombyx () - (Rank: genus) ( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=7090">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=7090</a> )	Parent
7091 ( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=7091">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=7091</a> )	NCBI Taxonomy ID	7091 ( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=7091">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=7091</a> )	NCBI Taxonomy ID
Yes	is Taxon A an Intraspecies?	Yes	is Taxon B an Intraspecies?
Bombyx mori - Bt susceptible strains	Taxon A Description	Bombyx mori - Bt resistant strains	Taxon B Description

GENOTYPIC CHANGE

ABCC2	Generic Gene Name	A0A0E3ZDK3 ( <a href="http://www.uniprot.org/uniprot/A0A0E3ZDK3">http://www.uniprot.org/uniprot/A0A0E3ZDK3</a> )	UniProtKB Plutella xylostella
-	Synonyms	0	GenebankID or UniProtKB
-	String		
-	Sequence Similarities		
GO:000524 : ATP binding ( <a href="https://www.ebi.ac.uk/QuickGO/term/GO:000524">https://www.ebi.ac.uk/QuickGO/term/GO:000524</a> )	GO - Molecular Function		
GO:0042626 : ATPase activity, coupled to transmembrane movement of substances ( <a href="https://www.ebi.ac.uk/QuickGO/term/GO:0042626">https://www.ebi.ac.uk/QuickGO/term/GO:0042626</a> )	GO - Biological Process		
-	GO - Cellular Component		

GO:0016021 : integral component of membrane  
(<https://www.ebi.ac.uk/QuickGO/term/GO:0016021>)

Presumptive Null

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

1-9 bp

Molecular Details of the Mutation

1a.a. insertion at codon 234 (Tyr)

Experimental Evidence

Linkage Mapping ([https://www.gephebase.org/search-criteria?/and+Experimental Evidence=~Linkage Mapping^#gephebase-summary-title](https://www.gephebase.org/search-criteria?/and+Experimental+Evidence=~Linkage+Mapping^#gephebase-summary-title))

Main Reference

Single amino acid mutation in an ATP-binding cassette transporter gene causes resistance to Bt toxin Cry1Ab in the silkworm, *Bombyx mori*. (2012)  
(<https://pubmed.ncbi.nlm.nih.gov/22635270>)

Authors

Atsumi S; Miyamoto K; Yamamoto K; Narukawa J; Kawai S; Sezutsu H; Kobayashi I; Uchino K; Tamura T; Mita K; Kadono-Okuda K; Wada S; Kanda K; Goldsmith MR; Noda H

Abstract

Bt toxins derived from the arthropod bacterial pathogen *Bacillus thuringiensis* are widely used for insect control as insecticides or in transgenic crops. Bt resistance has been found in field populations of several lepidopteran pests and in laboratory strains selected with Bt toxin. Widespread planting of crops expressing Bt toxins has raised concerns about the potential increase of resistance mutations in targeted insects. By using *Bombyx mori* as a model, we identified a candidate gene for a recessive form of resistance to Cry1Ab toxin on chromosome 15 by positional cloning. BGIBMGA007792-93, which encodes an ATP-binding cassette transporter similar to human multidrug resistance protein 4 and orthologous to genes associated with recessive resistance to Cry1Ac in *Heliothis virescens* and two other lepidopteran species, was expressed in the midgut. Sequences of 10 susceptible and seven resistant silkworm strains revealed a common tyrosine insertion in an outer loop of the predicted transmembrane structure of resistant alleles. We confirmed the role of this ATP-binding cassette transporter gene in Bt resistance by converting a resistant silkworm strain into a susceptible one by using germline transformation. This study represents a direct demonstration of Bt resistance gene function in insects with the use of transgenesis.

Additional References

## RELATED GEPHE

No matches found.

Related Genes

No matches found.

Related Haplotypes

## EXTERNAL LINKS

## COMMENTS