

## GEPHE SUMMARY

cadherin ( <a href="https://www.gephebase.org/search-criteria?/and+Gene">https://www.gephebase.org/search-criteria?/and+Gene</a> Gephebase= <sup>^</sup> cadherin <sup>^</sup> #gephebase-summary-title)	Gephebase Gene	GP00002464	GepheID
Published	Entry Status	Courtier	Main curator

## PHENOTYPIC CHANGE

Physiology ( <a href="https://www.gephebase.org/search-criteria?/and+Trait">https://www.gephebase.org/search-criteria?/and+Trait</a> Category= <sup>^</sup> Physiology <sup>^</sup> #gephebase-summary-title)	Trait Category		
Xenobiotic resistance (insecticide; Bt Cry1Ac toxin) ( <a href="https://www.gephebase.org/search-criteria?/and+Trait=&lt;sup&gt;^&lt;/sup&gt;Xenobiotic resistance (insecticide; Bt Cry1Ac toxin)&lt;sup&gt;^&lt;/sup&gt;#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Trait=<sup>^</sup>Xenobiotic resistance (insecticide; Bt Cry1Ac toxin)<sup>^</sup>#gephebase-summary-title</a> )	Trait		
Ostrinia furnacalis - Bt-Cry1Ac susceptible	Trait State in Taxon A		
Ostrinia furnacalis - Bt-Cry1Ac resistant lab selected strain	Trait State in Taxon B		
	Ancestral State		
	Taxonomic Status		
Intraspecific ( <a href="https://www.gephebase.org/search-criteria?/and+Taxonomic">https://www.gephebase.org/search-criteria?/and+Taxonomic</a> Status= <sup>^</sup> Intraspecific <sup>^</sup> #gephebase-summary-title)			
	Taxon A	Taxon B	
	Latin Name		Latin Name
Ostrinia furnacalis ( <a href="https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=&lt;sup&gt;^&lt;/sup&gt;Ostrinia furnacalis&lt;sup&gt;^&lt;/sup&gt;#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=<sup>^</sup>Ostrinia furnacalis<sup>^</sup>#gephebase-summary-title</a> )		Ostrinia furnacalis ( <a href="https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=&lt;sup&gt;^&lt;/sup&gt;Ostrinia furnacalis&lt;sup&gt;^&lt;/sup&gt;#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=<sup>^</sup>Ostrinia furnacalis<sup>^</sup>#gephebase-summary-title</a> )	
	Common Name		Common Name
Asian corn borer		Asian corn borer	
	Synonyms		Synonyms
Asian corn borer; Ostrinia furnacalis (Guenee, 1854); Ostrinia furnacalis		Asian corn borer; Ostrinia furnacalis (Guenee, 1854); Ostrinia furnacalis	
	Rank		Rank
species		species	
	Lineage		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; Pyraloidea; Crambidae; Pyraustinae; Ostrinia		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; Pyraloidea; Crambidae; Pyraustinae; Ostrinia	
	Parent		Parent
Ostrinia () - (Rank: genus) ( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=29056">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=29056</a> )		Ostrinia () - (Rank: genus) ( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=29056">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=29056</a> )	
	NCBI Taxonomy ID		NCBI Taxonomy ID
93504 ( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=93504">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=93504</a> )		93504 ( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=93504">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=93504</a> )	
	is Taxon A an Intraspecies?		is Taxon B an Intraspecies?
No		No	

## GENOTYPIC CHANGE

-	Generic Gene Name	UniProtKB Helicoverpa zea
-	Synonyms	A0A1B0RHM4 ( <a href="http://www.uniprot.org/uniprot/A0A1B0RHM4">http://www.uniprot.org/uniprot/A0A1B0RHM4</a> ) GenebankID or UniProtKB
-	String	0
-	Sequence Similarities	
-	GO - Molecular Function	
	GO:0005509 : calcium ion binding ( <a href="https://www.ebi.ac.uk/QuickGO/term/GO:0005509">https://www.ebi.ac.uk/QuickGO/term/GO:0005509</a> )	
	GO - Biological Process	
	GO:0007156 : homophilic cell adhesion via plasma membrane adhesion molecules ( <a href="https://www.ebi.ac.uk/QuickGO/term/GO:0007156">https://www.ebi.ac.uk/QuickGO/term/GO:0007156</a> )	
	GO - Cellular Component	
	GO:0016021 : integral component of membrane ( <a href="https://www.ebi.ac.uk/QuickGO/term/GO:0016021">https://www.ebi.ac.uk/QuickGO/term/GO:0016021</a> )	

GO:0005886 : plasma membrane (<https://www.ebi.ac.uk/QuickGO/term/GO:0005886>)

Presumptive Null

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

Molecular Type

Coding (<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>)

Deletion Size

10-99 bp

Molecular Details of the Mutation

MPR-r2 has a 26-amino acid residue deletion in the TBR which results in reduced binding of Cry1Ac compared to the MPR from the susceptible strain.

Experimental Evidence

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

Main Reference

Downregulation and mutation of a Cadherin gene associated with Cry1Ac resistance in the Asian Corn Borer, *Ostrinia furnacalis* (GuenÃ©). (2014) (<https://pubmed.ncbi.nlm.nih.gov/25216082>)

Authors

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Abstract

Development of resistance in target pests is a major threat to long-term use of transgenic crops expressing *Bacillus thuringiensis* (Bt) Cry toxins. To manage and/or delay the evolution of resistance in target insects through the implementation of effective strategies, it is essential to understand the basis of resistance. One of the most important mechanisms of insect resistance to Bt crops is the alteration of the interactions between Cry toxins and their receptors in the midgut. A Cry1Ac-selected strain of Asian corn borer (ACB), *Ostrinia furnacalis*, a key pest of maize in China, evolved three mutant alleles of a cadherin-like protein (OfCAD) (MPR-r1, MPR-r2 and MPR-r3), which mapped within the toxin-binding region (TBR). Each of the three mutant alleles possessed two or three amino acid substitutions in this region, especially Thr1457 $\rightarrow$ Ser. In highly resistant larvae (ACB-Ac200), MPR-r2 had a 26-amino acid residue deletion in the TBR, which resulted in reduced binding of Cry1Ac compared to the MPR from the susceptible strain, suggesting that the number of amino acid deletions influences the level of resistance. Furthermore, downregulation of OfCAD gene (*ofcad*) transcription was observed in the Cry1Ac resistant strain, ACB-Ac24, suggesting that Cry1Ac resistance in ACB is associated with the downregulation of the transcript levels of the cadherin-like protein gene. The OfCAD identified from ACB exhibited a high degree of similarity to other members of the cadherin super-family in lepidopteran species.

Additional References

Mechanisms of Resistance to Insecticidal Proteins from *Bacillus thuringiensis*. (2021) (<https://pubmed.ncbi.nlm.nih.gov/33417820>)

## RELATED GEPHE

Related Genes

No matches found.

Related Haplotypes

1 (<https://www.gephebase.org/search-criteria?/or+Gene+Gephebase=^cadherin^/and+Taxon+ID=^93504^/or+Gene+Gephebase=^cadherin^/and+Taxon+ID=^93504^#gephebase-summary-title>)

## EXTERNAL LINKS

## COMMENTS