GEPHE SUMMARY

Gephebase Gene
Aminopeptidase N (APN) (https://www.gephebase.org/search-criteria?/and+Gene Gephebase=^Aminopeptidase N (APN)^#gephebase-summary-title)

GepheID
GP00002463

Entry Status
Published

Main curator
Courtier

PHENOTYPIC CHANGE

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

Trait
Xenobiotic resistance (insecticide; Bt Cry2Ac toxin) (https://www.gephebase.org/search-criteria?/and+Trait=^Xenobiotic resistance (insecticide; Bt Cry2Ac toxin)^#gephebase-summary-title)

Trait State in Taxon A
Helicoverpa armigera - Bt-Cry2Ab susceptible

Trait State in Taxon B
Helicoverpa armigera - Bt-Cry2Ab resistant lab-selected strain

Ancestral State
Taxon A

Taxonomic Status
Experimental Evolution (https://www.gephebase.org/search-criteria?/and+Taxonomic Status=^Experimental Evolution^#gephebase-summary-title)

Taxon A

Latin Name
Helicoverpa armigera (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=^Helicoverpa armigera^#gephebase-summary-title)

Common Name
cotton bollworm

Synonyms
Heliothis (Helicoverpa) armigera; Heliothis armigera; cotton bollworm; American bollworm; corn ear worm; scarce bordered straw; tobacco budworm; Helicoverpa armigera (Hubner, 1808)

Rank
species

Lineage
cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Protostomia; Ecdysozoa; Panarthropoda; Arthropoda; Mandibulata; Pancrustacea; Hexapoda; Insecta; Dicondylia; Pterygota; Neoptera; Holometabola; Amphiesmenoptera; Lepidoptera; Glossata; Neolepidoptera; Heteroneura; Ditrysia; Obtectomera; Noctuoidea; Noctuidae; Heliothinae; Helicoverpa

Parent
Helicoverpa () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 7112)

NCBI Taxonomy ID
29058 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 29058)

is Taxon A an Infraspecies?
No

Taxon B

Latin Name
Helicoverpa armigera (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=^Helicoverpa armigera^#gephebase-summary-title)

Common Name
cotton bollworm

Synonyms
Heliothis (Helicoverpa) armigera; Heliothis armigera; cotton bollworm; American bollworm; corn ear worm; scarce bordered straw; tobacco budworm; Helicoverpa armigera (Hubner, 1808)

Rank
species

Lineage
cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Protostomia; Ecdysozoa; Panarthropoda; Arthropoda; Mandibulata; Pancrustacea; Hexapoda; Insecta; Dicondylia; Pterygota; Neoptera; Holometabola; Amphiesmenoptera; Lepidoptera; Glossata; Neolepidoptera; Heteroneura; Ditrysia; Obtectomera; Noctuoidea; Noctuidae; Heliothinae; Helicoverpa

Parent
Helicoverpa () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 7112)

NCBI Taxonomy ID
29058 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 29058)

is Taxon B an Infraspecies?
No

GENOTYPIC CHANGE

Generic Gene Name
apn

Synonyms
BcDNA:RE53127; CG15887; Dmel\CG15887

String
7227.FBpp0082244 (http://string-db.org/newstring_cgi/show_network_section.pl?identifier= 7227.FBpp0082244)

Sequence Similarities
-

GO - Molecular Function
-

GO - Biological Process
GO:0007424 : open tracheal system development

UniProtKB Drosophila melanogaster
Q9VFX3 (http://www.uniprot.org/uniprot/Q9VFX3)

GenebankID or UniProtKB
()

(https://www.ebi.ac.uk/QuickGO/term/GO:0007424)
GO:0035001 : dorsal trunk growth, open tracheal system
(https://www.ebi.ac.uk/QuickGO/term/GO:0035001)
GO:0035002 : liquid clearance, open tracheal system
(https://www.ebi.ac.uk/QuickGO/term/GO:0035002)
GO:0035149 : lumen formation, open tracheal system
(https://www.ebi.ac.uk/QuickGO/term/GO:0035149)
GO:1905477 : positive regulation of protein localization to membrane
(https://www.ebi.ac.uk/QuickGO/term/GO:1905477)
GO:0060438 : trachea development (https://www.ebi.ac.uk/QuickGO/term/GO:0060438)

GO - Cellular Component

GO:0016021 : integral component of membrane
(https://www.ebi.ac.uk/QuickGO/term/GO:0016021)
GO:0016324 : apical plasma membrane
(https://www.ebi.ac.uk/QuickGO/term/GO:0016324)

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

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

Deletion Size

10-99 bp

Molecular Details of the Mutation

deletion removing 22 amino acids. The mutant form failed to bind Cry1Ac unlike the full-length susceptible form.

Experimental Evidence

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

Main Reference

Molecular characterization and RNA interference of three midgut aminopeptidase N isozymes from Bacillus thuringiensis-susceptible and -resistant strains of sugarcane borer, Diatraea saccharalis. (2010) (https://pubmed.ncbi.nlm.nih.gov/20685334)

Authors

Yang Y; Zhu YC; Ottea J; Husseneder C; Leonard BR; Abel C; Huang F

Abstract

Aminopeptidase N (APN) proteins located at the midgut epithelium of some lepidopteran species have been implicated as receptors for insecticidal proteins from Bacillus thuringiensis. cDNAs of three APN isoforms, DsAPN1, DsAPN2, and DsAPN3, from Cry1Ab-susceptible (Cry1Ab-SS) and -resistant (Cry1Ab-RR) strains of the sugarcane borer, Diatraea saccharalis (F.) (Lepidoptera: Crambidae), were identified and sequenced using reverse transcriptase polymerase chain reaction (RT-PCR) and 5′ rapid amplification of cDNA end (5′ RACE). The characteristic APN sequence features were derived from deduced amino acid sequences of the cloned cDNAs. cDNA sequences of the three APN genes were identical between the Cry1Ab-SS and -RR strains. However, total APN proteolytic activity and gene expression of the three APNs from Cry1Ab-RR larvae were significantly lower than those of the Cry1Ab-SS strain. RNA interference (RNAi) was employed using an oral droplet feeding technique for the three APNs of the Cry1Ab-SS strain. Down-regulating expressions of the three APN genes by RNAi were corresponding to the reductions in the specific APN activity. In addition, silencing of all three APNs in D. saccharalis in vivo by RNAi resulted in a decrease in Cry1Ab susceptibility. Our results showed that reduction in expression of the three APNs is functionally associated with the Cry1Ab resistance in D. saccharalis.

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Additional References

RELATED GEPHE

Related Genes

6 (ABCA2, cadherin, CYP337B3, Ha_BtR, para (kdr), tetraspanin) (https://www.gephebase.org/search-criteria?/or+Taxon ID=^29058^/and+Trait=Xenobiotic resistance/and+groupHaplotypes=true#gephebase-summary-title)

Related Haplotypes

No matches found.

EXTERNAL LINKS

COMMENTS

Corect main ref is PMID 19376227 (bug in Gephebase which prevents to enter the correct reference)