## GEPHE SUMMARY

Gephebase Gene
CYP337B3 (https://www.gephebase.org/search-criteria?/and+Gene Gephebase=^CYP337B3^#gephebase-summary-title)

GepheID
GP00002480

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

Trait State in Taxon A
Helicoverpa armigera - susceptible

Trait State in Taxon B
Helicoverpa armigera - resistant strain from China - allele CYP337B3v3

Ancestral State
Taxon A

Taxonomic Status
Intraspecific (https://www.gephebase.org/search-criteria?/and+Taxonomic Status=^Intraspecific^#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
CYP337B3

Synonyms
-

String
-

Sequence Similarities
Belongs to the cytochrome P450 family.

GO - Molecular Function
GO:0020037 : heme binding (https://www.ebi.ac.uk/QuickGO/term/GO:0020037)
GO:0005506 : iron ion binding (https://www.ebi.ac.uk/QuickGO/term/GO:0005506)
GO:0004497 : monooxygenase activity (https://www.ebi.ac.uk/QuickGO/term/GO:0004497)
GO:0016705 : oxidoreductase activity, acting on paired donors, with incorporation or

UniProtKB Helicoverpa armigera
A0A0H3V333 (http://www.uniprot.org/uniprot/A0A0H3V333)

GenebankID or UniProtKB Helicoverpa armigera
A0A0H3V333 (https://www.ncbi.nlm.nih.gov/nuccore/A0A0H3V333)

reduction of molecular oxygen (https://www.ebi.ac.uk/QuickGO/term/GO:0016705)

GO - Biological Process

-

GO - Cellular Component

GO:0005789 : endoplasmic reticulum membrane (https://www.ebi.ac.uk/QuickGO/term/GO:0005789)

Presumptive Null

No (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)

Aberration Type

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

Molecular Details of the Mutation

The P450 chimeric gene CYP337B3 arose from unequal crossing-over between two parental P450 genes CYP337B2 and CYP337B1 . CYP337B3 can metabolize pyrethroids in vitro. Neither parental enzyme has the ability to metabolize pyrethroids in vitro. Sequence analysis revealed a distinct CYP337B3 allele (CYP337B3v2) in the Pakistani population and three distinct alleles in the Chinese populations (CYP337B3v2 CYP337B3v3 CYP337B3v4) that differ from the Australian allele (CYP337B3v1) by a number of synonymous and non-synonymous SNPs in addition to variability of the intron sequence and size. This variation may result from different crossing-over positions during recombination of the CYP337B1 and CYP337B2 parental genes with different alleles of CYP337B1 and CYP337B2 involved in the crossing-over.

Experimental Evidence

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

Main Reference

Variation in P450-mediated fenvalerate resistance levels is not correlated with CYP337B3 genotype in Chinese populations of Helicoverpa armigera . (2015 ) (https://pubmed.ncbi.nlm.nih.gov/00000000.000023)

Authors

Han Yangchun; Yu Wanting; Zhang Weiqing; Yang Yihua; Walsh Tom; Oakeshott John G; Wu Yidong

Abstract

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Additional References

Multiple recombination events between two cytochrome P450 loci contribute to global pyrethroid resistance in Helicoverpa armigera. (2018) (https://pubmed.ncbi.nlm.nih.gov/30383872)

## RELATED GEPHE

Related Genes

6 (ABCA2, Aminopeptidase N (APN), cadherin, 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

7 (https://www.gephebase.org/search-criteria?/or+Gene Gephebase=^CYP337B3^/and+Taxon ID=^29058^/or+Gene Gephebase=^CYP337B3^/and+Taxon ID=^29058^#gephebase-summary-title)

## EXTERNAL LINKS

## COMMENTS

@Parallelism - Resistance to pyrethroids as a result from the formation of a chimeric P450 gene CYP337B3 has arisen multiple times during evolution of the cotton bollworm H. armigera.