

## GEPHE SUMMARY

<p>CYP337B3 (<a href="https://www.gephebase.org/search-criteria?/and+GeneGephebase=CYP337B3#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+GeneGephebase=CYP337B3#gephebase-summary-title</a>)</p> <p>Published</p>	<p>Gephebase Gene</p> <p>Entry Status</p>	<p>GP00002485</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+TraitCategory=Physiology#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+TraitCategory=Physiology#gephebase-summary-title</a>)</p> <p>Xenobiotic resistance (insecticide; pyrethroid) (<a href="https://www.gephebase.org/search-criteria?/and+Trait=Xenobiotic+resistance+(insecticide;+pyrethroid)#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Trait=Xenobiotic+resistance+(insecticide;+pyrethroid)#gephebase-summary-title</a>)</p> <p>Helicoverpa zea - susceptible</p> <p>Helicoverpa zea - native species present in Brazil - resistant individuals</p> <p>Taxon A</p> <p>Intraspecific (<a href="https://www.gephebase.org/search-criteria?/and+TaxonomicStatus=Intraspecific#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+TaxonomicStatus=Intraspecific#gephebase-summary-title</a>)</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>Helicoverpa zea</p> <p>Heliothis zea; corn earworm; bollworm; tomato fruitworm; <i>Helicoverpa zea</i> (Boddie, 1850) species</p> <p>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; Noctuoidea; Noctuidae; Heliothinae; <i>Helicoverpa</i></p> <p><i>Helicoverpa</i> () - (Rank: genus) (<a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=7112">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=7112</a>)</p> <p>7113 (<a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=7113">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=7113</a>)</p> <p>No is Taxon A an Intraspecies?</p>	<p>Taxon A</p> <p>Latin Name</p> <p>Common Name</p> <p>Synonyms</p> <p>Rank</p> <p>Lineage</p> <p>Parent</p> <p>NCBI Taxonomy ID</p>	<p>Helicoverpa zea</p> <p>Heliothis zea; corn earworm; bollworm; tomato fruitworm; <i>Helicoverpa zea</i> (Boddie, 1850) species</p> <p>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; Noctuoidea; Noctuidae; Heliothinae; <i>Helicoverpa</i></p> <p><i>Helicoverpa</i> () - (Rank: genus) (<a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=7112">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=7112</a>)</p> <p>7113 (<a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=7113">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=7113</a>)</p> <p>No is Taxon B an Intraspecies?</p>	<p>Taxon B</p> <p>Latin Name</p> <p>Common Name</p> <p>Synonyms</p> <p>Rank</p> <p>Lineage</p> <p>Parent</p> <p>NCBI Taxonomy ID</p>
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## GENOTYPIC CHANGE

<p>CYP337B3</p> <p>-</p> <p>-</p> <p>Belongs to the cytochrome P450 family.</p> <p>GO:0020037 : heme binding (<a href="https://www.ebi.ac.uk/QuickGO/term/GO:0020037">https://www.ebi.ac.uk/QuickGO/term/GO:0020037</a>)</p> <p>GO:0005506 : iron ion binding (<a href="https://www.ebi.ac.uk/QuickGO/term/GO:0005506">https://www.ebi.ac.uk/QuickGO/term/GO:0005506</a>)</p> <p>GO:0004497 : monooxygenase activity (<a href="https://www.ebi.ac.uk/QuickGO/term/GO:0004497">https://www.ebi.ac.uk/QuickGO/term/GO:0004497</a>)</p> <p>GO:0016705 : oxidoreductase activity, acting on paired donors, with incorporation or reduction of molecular oxygen (<a href="https://www.ebi.ac.uk/QuickGO/term/GO:0016705">https://www.ebi.ac.uk/QuickGO/term/GO:0016705</a>)</p>	<p>Generic Gene Name</p> <p>Synonyms</p> <p>String</p> <p>Sequence Similarities</p> <p>GO - Molecular Function</p> <p>GO - Biological Process</p>	<p>A0A0H3V333 (<a href="http://www.uniprot.org/uniprot/A0A0H3V333">http://www.uniprot.org/uniprot/A0A0H3V333</a>)</p> <p>0</p> <p>UniProtKB <i>Helicoverpa armigera</i></p> <p>GenebankID or UniProtKB</p>
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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](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

Molecular Details of the Mutation

Introgression of the CYP337B3v2 resistant allele from *Helicoverpa armigera*

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

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

Authors

Walsh TK; Joussen N; Tian K; McGaughran A; Anderson CJ; Qiu X; Ahn SJ; Bird L; Pavlidi N; Vontas J; Ryu J; Rasool A; Barony Macedo I; Tay WT; Zhang Y; Whitehouse MEA; Silvie PJ; Downes S; Nemeč L; Heckel DG

Abstract

The cotton bollworm, *Helicoverpa armigera* (H<sup>1</sup>/4bner) is one of the most serious insect pest species to evolve resistance against many insecticides from different chemical classes. This species has evolved resistance to the pyrethroid insecticides across its native range and is becoming a truly global pest after establishing in South America and having been recently recorded in North America. A chimeric cytochrome P450 gene, CYP337B3, has been identified as a resistance mechanism for resistance to fenvalerate and cypermethrin. Here we show that this resistance mechanism is common around the world with at least eight different alleles. It is present in South America and has probably introgressed into its closely related native sibling species, *Helicoverpa zea*. The different alleles of CYP337B3 are likely to have arisen independently in different geographic locations from selection on existing diversity. The alleles found in Brazil are those most commonly found in Asia, suggesting a potential origin for the incursion of *H. armigera* into the Americas.

Additional References

Adaptive Introgression across Semipermeable Species Boundaries between Local *Helicoverpa zea* and Invasive *Helicoverpa armigera* Moths. (2020) (<https://pubmed.ncbi.nlm.nih.gov/32348505>)

RELATED GEPHE

Related Genes

1 (para (kdr)) ([https://www.gephebase.org/search-criteria?/or+Taxon ID+7113+and+Trait=Xenobiotic resistance+and+groupHaplotypes=true+Gephebase-summary-title](https://www.gephebase.org/search-criteria?/or+Taxon+ID+7113+and+Trait=Xenobiotic+resistance+and+groupHaplotypes=true+Gephebase-summary-title))

Related Haplotypes

No matches found.

EXTERNAL LINKS

COMMENTS

@Introgression - *H. zea* has been shown to interbreed with *H. armigera* in the laboratory to produce viable offspring. @SelectiveSweep