

## GEPHE SUMMARY

nAChR ( <a href="https://www.gephebase.org/search-criteria?/and+GeneGephebase=nAChR^#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+GeneGephebase=nAChR^#gephebase-summary-title</a> )	Gephebase Gene	GP00002651	GepheID
Published	Entry Status	Courtier	Main curator

## PHENOTYPIC CHANGE

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> )	Trait Category		
Xenobiotic resistance (insecticide; spinosad) ( <a href="https://www.gephebase.org/search-criteria?/and+Trait=Xenobiotic%20resistance%20(insecticide%3B%20spinosad)^#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Trait=Xenobiotic resistance (insecticide; spinosad)^#gephebase-summary-title</a> )	Trait		
Plutella xylostella - sensitive	Trait State in Taxon A		
Plutella xylostella - resistant	Trait State in Taxon B		
Taxon A	Ancestral State		
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> )	Taxonomic Status		
	Taxon A	Taxon B	
Plutella xylostella ( <a href="https://www.gephebase.org/search-criteria?/and+Taxon%20and%20Synonyms=Plutella%20xylostella^#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=Plutella xylostella^#gephebase-summary-title</a> )	Latin Name	Plutella xylostella ( <a href="https://www.gephebase.org/search-criteria?/and+Taxon%20and%20Synonyms=Plutella%20xylostella^#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=Plutella xylostella^#gephebase-summary-title</a> )	Latin Name
diamondback moth	Common Name	diamondback moth	Common Name
diamondback moth; cabbage moth; Plutella xylostella (Linnaeus, 1758); Putella xylostella	Synonyms	diamondback moth; cabbage moth; Plutella xylostella (Linnaeus, 1758); Putella xylostella	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; Dityrsia; Yponomeutoidea; Plutellidae; Plutella	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; Dityrsia; Yponomeutoidea; Plutellidae; Plutella	Lineage
Plutella () - (Rank: genus) ( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=51654">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=51654</a> )	Parent	Plutella () - (Rank: genus) ( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=51654">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=51654</a> )	Parent
51655 ( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=51655">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=51655</a> )	NCBI Taxonomy ID	51655 ( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=51655">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=51655</a> )	NCBI Taxonomy ID
No	is Taxon A an Intraspecies?	No	is Taxon B an Intraspecies?

## GENOTYPIC CHANGE

CHRNA6	Generic Gene Name	Q15825 ( <a href="http://www.uniprot.org/uniprot/Q15825">http://www.uniprot.org/uniprot/Q15825</a> )	UniProtKB Homo sapiens
CHNRA6	Synonyms	()	GenebankID or UniProtKB
9606.ENSP00000276410 ( <a href="http://string-db.org/newstring.cgi/show_network_section.pl?identifier=9606.ENSP00000276410">http://string-db.org/newstring.cgi/show_network_section.pl?identifier=9606.ENSP00000276410</a> )	String		
Belongs to the ligand-gated ion channel (TC 1.A.9) family. Acetylcholine receptor (TC 1.A.9.1) subfamily. Alpha-6/CHRNA6 sub-subfamily.	Sequence Similarities		
GO:0015464 : acetylcholine receptor activity ( <a href="https://www.ebi.ac.uk/QuickGO/term/GO:0015464">https://www.ebi.ac.uk/QuickGO/term/GO:0015464</a> )	GO - Molecular Function		
GO:0022848 : acetylcholine-gated cation-selective channel activity ( <a href="https://www.ebi.ac.uk/QuickGO/term/GO:0022848">https://www.ebi.ac.uk/QuickGO/term/GO:0022848</a> )			
GO:1904315 : transmitter-gated ion channel activity involved in regulation of postsynaptic			

membrane potential (<https://www.ebi.ac.uk/QuickGO/term/GO:1904315>)  
 GO:0005231 : excitatory extracellular ligand-gated ion channel activity  
 (<https://www.ebi.ac.uk/QuickGO/term/GO:0005231>)  
 GO:0030594 : neurotransmitter receptor activity  
 (<https://www.ebi.ac.uk/QuickGO/term/GO:0030594>)

GO - Biological Process

GO:0007165 : signal transduction (<https://www.ebi.ac.uk/QuickGO/term/GO:0007165>)  
 GO:0007268 : chemical synaptic transmission  
 (<https://www.ebi.ac.uk/QuickGO/term/GO:0007268>)  
 GO:0034220 : ion transmembrane transport  
 (<https://www.ebi.ac.uk/QuickGO/term/GO:0034220>)  
 GO:0050877 : nervous system process  
 (<https://www.ebi.ac.uk/QuickGO/term/GO:0050877>)  
 GO:0042391 : regulation of membrane potential  
 (<https://www.ebi.ac.uk/QuickGO/term/GO:0042391>)  
 GO:0014059 : regulation of dopamine secretion  
 (<https://www.ebi.ac.uk/QuickGO/term/GO:0014059>)  
 GO:0051899 : membrane depolarization  
 (<https://www.ebi.ac.uk/QuickGO/term/GO:0051899>)  
 GO:2000300 : regulation of synaptic vesicle exocytosis  
 (<https://www.ebi.ac.uk/QuickGO/term/GO:2000300>)

GO - Cellular Component

GO:0005886 : plasma membrane (<https://www.ebi.ac.uk/QuickGO/term/GO:0005886>)  
 GO:0005887 : integral component of plasma membrane  
 (<https://www.ebi.ac.uk/QuickGO/term/GO:0005887>)  
 GO:0043005 : neuron projection (<https://www.ebi.ac.uk/QuickGO/term/GO:0043005>)  
 GO:0045202 : synapse (<https://www.ebi.ac.uk/QuickGO/term/GO:0045202>)  
 GO:0005892 : acetylcholine-gated channel complex  
 (<https://www.ebi.ac.uk/QuickGO/term/GO:0005892>)  
 GO:0099055 : integral component of postsynaptic membrane  
 (<https://www.ebi.ac.uk/QuickGO/term/GO:0099055>)  
 GO:0099056 : integral component of presynaptic membrane  
 (<https://www.ebi.ac.uk/QuickGO/term/GO:0099056>)  
 GO:0070161 : anchoring junction (<https://www.ebi.ac.uk/QuickGO/term/GO:0070161>)  
 GO:0098691 : dopaminergic synapse (<https://www.ebi.ac.uk/QuickGO/term/GO:0098691>)

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

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

SNP Coding Change

-

Molecular Details of the Mutation

A mutation within the ninth intron splice junction of P $\alpha$ 6 results in mis-splicing of transcripts and produce a predicted protein truncated between the third and fourth transmembrane domains.

Experimental Evidence

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

	Taxon A	Taxon B	Position
Codon	-	-	-
Amino-acid	-	-	-

Main Reference

Mis-spliced transcripts of nicotinic acetylcholine receptor alpha6 are associated with field evolved spinosad resistance in *Plutella xylostella* (L.). (2010)  
 (<https://pubmed.ncbi.nlm.nih.gov/20062520>)

Authors

Baxter SW; Chen M; Dawson A; Zhao JZ; Vogel H; Shelton AM; Heckel DG; Jiggins CD

Abstract

The evolution of insecticide resistance is a global constraint to agricultural production. Spinosad is a new, low-environmental-risk insecticide that primarily targets nicotinic acetylcholine receptors (nAChR) and is effective against a wide range of pest species. However, after only a few years of application, field evolved resistance emerged in the diamondback moth, *Plutella xylostella*, an important pest of brassica crops worldwide. Spinosad resistance in a Hawaiian population results from a single incompletely recessive and autosomal gene, and here we use AFLP linkage mapping to identify the chromosome controlling resistance in a backcross family. Recombinational mapping with more than 700 backcross progeny positioned a putative spinosad target, nAChR alpha 6 (P $\alpha$ 6), at the resistance locus, P $\alpha$ SpinR. A mutation within the ninth intron splice junction of P $\alpha$ 6 results in mis-splicing of transcripts, which produce a predicted protein truncated between the third and fourth transmembrane domains. Additional resistance-associated P $\alpha$ 6 transcripts that excluded the mutation containing exon were detected, and these were also predicted to produce truncated proteins. Identification of the locus of resistance in this important crop pest will facilitate field monitoring of the spread of resistance and offer insights into the genetic basis of spinosad resistance in other species.

Additional References

10 (ABCC2, Acetylcholinesterase (Ace-1), Chitin synthase 1 (CHS1), CYP6BG1, FMO2, glutamate-gated chloride channel (GluCl), MAP4K4, para (kdr), resistance to dieldrin, RYR)  
(<https://www.gephebase.org/search-criteria?/or+Taxon ID=^51655^/and+Trait=Xenobiotic resistance/and+groupHaplotypes=true#gephebase-summary-title>)

Related Haplotypes

2 (<https://www.gephebase.org/search-criteria?/or+Gene Gephebase=^nAChR^/and+Taxon ID=^51655^/or+Gene Gephebase=^nAChR^/and+Taxon ID=^51655^#gephebase-summary-title>)

## EXTERNAL LINKS

## COMMENTS

@Splicing