

## GEPHE SUMMARY

nAChR ( <a +nachr+"#gephebase-summary-title"="" href="https://www.gephebase.org/search-criteria?/and+Gene+Gephebase=">https://www.gephebase.org/search-criteria?/and+Gene+Gephebase="+nAChR+"#gephebase-summary-title</a> )	Gephebase Gene	GP00002554	GepheID
Published	Entry Status	Courtier	Main curator

## PHENOTYPIC CHANGE

Physiology ( <a +physiology+"#gephebase-summary-title"="" href="https://www.gephebase.org/search-criteria?/and+Trait+Category=">https://www.gephebase.org/search-criteria?/and+Trait+Category="+Physiology+"#gephebase-summary-title</a> )	Trait Category		
Xenobiotic resistance (insecticide; spinosad; spirotetramat) ( <a +xenobiotic+resistance+(insecticide;+spinosad;+spirotetramat)+"#gephebase-summary-title"="" href="https://www.gephebase.org/search-criteria?/and+Trait=">https://www.gephebase.org/search-criteria?/and+Trait="+Xenobiotic+resistance+(insecticide;+spinosad;+spirotetramat)+"#gephebase-summary-title</a> )	Trait		
Frankliniella occidentalis	Trait State in Taxon A		
Frankliniella occidentalis - resistant	Trait State in Taxon B		
Taxon A	Ancestral State		
Intraspecific ( <a +intraspecific+"#gephebase-summary-title"="" href="https://www.gephebase.org/search-criteria?/and+Taxonomic+Status=">https://www.gephebase.org/search-criteria?/and+Taxonomic+Status="+Intraspecific+"#gephebase-summary-title</a> )	Taxonomic Status		
	Taxon A	Taxon B	
Frankliniella occidentalis ( <a +frankliniella+occidentalis+"#gephebase-summary-title"="" href="https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=">https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms="+Frankliniella+occidentalis+"#gephebase-summary-title</a> )	Latin Name	Frankliniella occidentalis ( <a +frankliniella+occidentalis+"#gephebase-summary-title"="" href="https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=">https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms="+Frankliniella+occidentalis+"#gephebase-summary-title</a> )	Latin Name
western flower thrips	Common Name	western flower thrips	Common Name
Euthrips occidentalis; Frankliniella brunnescens; Frankliniella californica; Frankliniella occidentalis brunnescens; western flower thrips; Frankliniella occidentalis (Pergande, 1895); Frankliniella occidentalis brunnescens Priesner, 1932	Synonyms	Euthrips occidentalis; Frankliniella brunnescens; Frankliniella californica; Frankliniella occidentalis brunnescens; western flower thrips; Frankliniella occidentalis (Pergande, 1895); Frankliniella occidentalis brunnescens Priesner, 1932	Synonyms
species	Rank	species	Rank
cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Protostomia; Ecdysozoa; Panarthropoda; Arthropoda; Mandibulata; Pancrustacea; Hexapoda; Insecta; Dicondylia; Pterygota; Neoptera; Paraneoptera; Thysanoptera; Terebrantia; Thripidae; Thripinae; Frankliniella	Lineage	cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Protostomia; Ecdysozoa; Panarthropoda; Arthropoda; Mandibulata; Pancrustacea; Hexapoda; Insecta; Dicondylia; Pterygota; Neoptera; Paraneoptera; Thysanoptera; Terebrantia; Thripidae; Thripinae; Frankliniella	Lineage
Frankliniella () - (Rank: genus) ( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=45059">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=45059</a> )	Parent	Frankliniella () - (Rank: genus) ( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=45059">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=45059</a> )	Parent
133901 ( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=133901">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=133901</a> )	NCBI Taxonomy ID	133901 ( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=133901">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=133901</a> )	NCBI Taxonomy ID
No	is Taxon A an Intraspecies?	No	is Taxon B an Intraspecies?

## GENOTYPIC CHANGE

nAChRbeta1	Generic Gene Name	P04755 ( <a href="http://www.uniprot.org/uniprot/P04755">http://www.uniprot.org/uniprot/P04755</a> )	UniProtKB Drosophila melanogaster
AChR; AchR64B; AChR64B; Acr64B; AcrD; ard; Ard; ARD; beta 64B; beta1 nAChR; CG11348; CG11348-PA; CG12606; Dbeta1; Dmel\CG11348; nAChR; nAChR-beta64B; nAcR64B; nAcRbeta-64B	Synonyms	()	GenebankID or UniProtKB
7227.FBpp0073155 ( <a href="http://string-db.org/newstring.cgi/show_network_section.pl?identifier=7227.FBpp0073155">http://string-db.org/newstring.cgi/show_network_section.pl?identifier=7227.FBpp0073155</a> )	String		
Belongs to the ligand-gated ion channel (TC 1.A.9) family. Acetylcholine receptor (TC 1.A.9.1) subfamily.	Sequence Similarities		
GO:0004888 : transmembrane signaling receptor activity	GO - Molecular Function		

(<https://www.ebi.ac.uk/QuickGO/term/GO:0004888>)  
 GO:0022848 : acetylcholine-gated cation-selective channel activity  
 (<https://www.ebi.ac.uk/QuickGO/term/GO:0022848>)  
 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:0007271 : synaptic transmission, cholinergic  
 (<https://www.ebi.ac.uk/QuickGO/term/GO:0007271>)  
 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 - Cellular Component

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:0045211 : postsynaptic membrane  
 (<https://www.ebi.ac.uk/QuickGO/term/GO:0045211>)  
 GO:0045202 : synapse (<https://www.ebi.ac.uk/QuickGO/term/GO:0045202>)  
 GO:0070161 : anchoring junction (<https://www.ebi.ac.uk/QuickGO/term/GO:0070161>)

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

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

SNP Coding Change

Nonsynonymous

Molecular Details of the Mutation

G275E in nAChR alpha 6 due to a single nucleotide change

Experimental Evidence

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

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

Main Reference

A nicotinic acetylcholine receptor transmembrane point mutation (G275E) associated with resistance to spinosad in *Frankliniella occidentalis*. (2013)  
 (<https://pubmed.ncbi.nlm.nih.gov/23016960>)

Authors

Puinean AM; Lansdell SJ; Collins T; Bielza P; Millar NS

Abstract

High levels of resistance to spinosad, a macrocyclic lactone insecticide, have been reported previously in western flower thrips, *Frankliniella occidentalis*, an economically important insect pest of vegetables, fruit and ornamental crops. We have cloned the nicotinic acetylcholine receptor (nAChR)  $\hat{I}\pm 6$  subunit from *F. occidentalis* (Fo $\hat{I}\pm 6$ ) and compared the nucleotide sequence of Fo $\hat{I}\pm 6$  from susceptible and spinosad-resistant insect populations (MLFOM and R1S respectively). A single nucleotide change has been identified in Fo $\hat{I}\pm 6$ , resulting in the replacement of a glycine (G) residue in susceptible insects with a glutamic acid (E) in resistant insects. The resistance-associated mutation (G275E) is predicted to lie at the top of the third  $\hat{I}\pm 6$ -helical transmembrane domain of Fo $\hat{I}\pm 6$ . Although there is no direct evidence identifying the location of the spinosad binding site, the analogous amino acid in the *C. elegans* glutamate-gated chloride channel lies in close proximity (4.4 Å...) to the known binding site of ivermectin, another macrocyclic lactone pesticide. The functional consequences of the resistance-associated mutation have been examined in the human nAChR  $\hat{I}\pm 7$  subunit. Introduction of an analogous (A272E) mutation in  $\hat{I}\pm 7$  abolishes the modulatory effects of spinosad whilst having no significant effect upon activation by acetylcholine, consistent with spinosad having an allosteric mechanism of action.

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Additional References

Genotype to phenotype, the molecular and physiological dimensions of resistance in arthropods. (2015) (<https://pubmed.ncbi.nlm.nih.gov/26047113>)  
 Increasing Frequency of G275E Mutation in the Nicotinic Acetylcholine Receptor  $\hat{I}\pm 6$  Subunit Conferring Spinetoram Resistance in Invading Populations of Western Flower Thrips in China. (2022) (<https://pubmed.ncbi.nlm.nih.gov/35447773>)  
 A CRISPR/Cas9 mediated point mutation in the alpha 6 subunit of the nicotinic acetylcholine receptor confers resistance to spinosad in *Drosophila melanogaster*. (2016)  
 (<https://pubmed.ncbi.nlm.nih.gov/27117524>)

No matches found.

## EXTERNAL LINKS

## COMMENTS