

GEPHE SUMMARY

	Gephebase Gene		GepheID
Acetylcholinesterase (Ace-1) (https://www.gephebase.org/search-criteria?/and+Gene)		GP00002580	
Gephebase= [^] Acetylcholinesterase (Ace-1) [^] #gephebase-summary-title			Main curator
Published	Entry Status	Courtier	

PHENOTYPIC CHANGE

	Trait Category		
Physiology (https://www.gephebase.org/search-criteria?/and+Trait)			
Category= [^] Physiology [^] #gephebase-summary-title	Trait		
Xenobiotic resistance (insecticide) (https://www.gephebase.org/search-criteria?/and+Trait)			
criteria= [^] Xenobiotic resistance (insecticide) [^] #gephebase-summary-title	Trait State in Taxon A		
Cydia pomonella - sensitive			
	Trait State in Taxon B		
Cydia pomonella - resistant			
	Ancestral State		
Taxon A			
	Taxonomic Status		
Intraspecific (https://www.gephebase.org/search-criteria?/and+Taxonomic)			
Status= [^] Intraspecific [^] #gephebase-summary-title			
	Taxon A	Taxon B	
	Latin Name		Latin Name
Cydia pomonella		Cydia pomonella	
(https://www.gephebase.org/search-criteria?/and+Taxon)		(https://www.gephebase.org/search-criteria?/and+Taxon)	
pomonella [^] #gephebase-summary-title	Common Name	pomonella [^] #gephebase-summary-title	Common Name
codling moth		codling moth	
	Synonyms		Synonyms
codling moth; Cydia pomonella (Linnaeus, 1758)		codling moth; Cydia pomonella (Linnaeus, 1758)	
	Rank		Rank
species		species	
	Lineage		Lineage
cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Protostomia;		cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Protostomia;	
Ecdysozoa; Panarthropoda; Arthropoda; Mandibulata; Pancrustacea; Hexapoda; Insecta;		Ecdysozoa; Panarthropoda; Arthropoda; Mandibulata; Pancrustacea; Hexapoda; Insecta;	
Dicondylia; Pterygota; Neoptera; Holometabola; Amphimesnoptera; Lepidoptera;		Dicondylia; Pterygota; Neoptera; Holometabola; Amphimesnoptera; Lepidoptera;	
Glossata; Neolepidoptera; Heteroneura; Dityrsia; Apodityrsia; Tortricoidea; Tortricidae;		Glossata; Neolepidoptera; Heteroneura; Dityrsia; Apodityrsia; Tortricoidea; Tortricidae;	
Olethreutinae; Grapholitini; Cydia		Olethreutinae; Grapholitini; Cydia	
	Parent		Parent
Cydia () - (Rank: genus)		Cydia () - (Rank: genus)	
(https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=82599)		(https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=82599)	
	NCBI Taxonomy ID		NCBI Taxonomy ID
82600		82600	
(https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=82600)		(https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=82600)	
	is Taxon A an Intraspecies?		is Taxon B an Intraspecies?
No		No	

GENOTYPIC CHANGE

	Generic Gene Name		UniProtKB Drosophila melanogaster
Ace		P07140 (http://www.uniprot.org/uniprot/P07140)	
	Synonyms		GenebankID or UniProtKB
AcChE; ace; ACE; ace-2; ache; AchE; AChE; CG17907; CHE; dAChE; dmAChE;		()	
DmAChE; Dmel\CG17907; Dm_ace; FBgn0000024; l(3)26; l(3)87Ed	String		
7227.FBpp0289713			
(http://string-db.org/newstring.cgi/show_network_section.pl?identifier=7227.FBpp0289713)			
	Sequence Similarities		
Belongs to the type-B carboxylesterase/lipase family.			
	GO - Molecular Function		
GO:0042803 : protein homodimerization activity			
(https://www.ebi.ac.uk/QuickGO/term/GO:0042803)			
GO:0003990 : acetylcholinesterase activity			
(https://www.ebi.ac.uk/QuickGO/term/GO:0003990)			
GO:0004104 : cholinesterase activity (https://www.ebi.ac.uk/QuickGO/term/GO:0004104)			

GO:0043199 : sulfate binding (<https://www.ebi.ac.uk/QuickGO/term/GO:0043199>)
GO - Biological Process

GO:0006581 : acetylcholine catabolic process
(<https://www.ebi.ac.uk/QuickGO/term/GO:0006581>)
GO:0001507 : acetylcholine catabolic process in synaptic cleft
(<https://www.ebi.ac.uk/QuickGO/term/GO:0001507>)
GO:0007268 : chemical synaptic transmission
(<https://www.ebi.ac.uk/QuickGO/term/GO:0007268>)
GO:0042426 : choline catabolic process
(<https://www.ebi.ac.uk/QuickGO/term/GO:0042426>)
GO:0042331 : phototaxis (<https://www.ebi.ac.uk/QuickGO/term/GO:0042331>)

GO - Cellular Component

GO:0005886 : plasma membrane (<https://www.ebi.ac.uk/QuickGO/term/GO:0005886>)
GO:0005737 : cytoplasm (<https://www.ebi.ac.uk/QuickGO/term/GO:0005737>)
GO:0031225 : anchored component of membrane
(<https://www.ebi.ac.uk/QuickGO/term/GO:0031225>)
GO:0030054 : cell junction (<https://www.ebi.ac.uk/QuickGO/term/GO:0030054>)
GO:0043083 : synaptic cleft (<https://www.ebi.ac.uk/QuickGO/term/GO:0043083>)

No (<https://www.gephebase.org/search-criteria?/and+Presumptive+Null=~No~#gephebase-summary-title>)

Presumptive Null

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

Molecular Type

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

Aberration Type

Nonsynonymous

SNP Coding Change

F399V = F290V

Molecular Details of the Mutation

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

Experimental Evidence

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

Main Reference

Acetylcholinesterase mutation in an insecticide-resistant population of the codling moth *Cydia pomonella* (L.). (2006) (<https://pubmed.ncbi.nlm.nih.gov/16876707>)

Authors

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Abstract

Two strains of *Cydia pomonella* (L.) (Lepidoptera: Tortricidae) were selected in the lab by exposure to increasing concentrations of diflubenzuron (Rdfb strain) or azinphos-methyl (Raz strain). Insecticide bioassays showed that the adults of the Rdfb strain exhibited a 2.6-fold and a 7.7-fold resistance ratio to azinphos-methyl and carbaryl, respectively compared to a susceptible strain (S) whereas the adults of the Raz strain exhibited a 6.7-fold resistance ratio to azinphos-methyl and a 130-fold resistance ratio to carbaryl. In the Raz strain, a target site resistance mechanism was suggested by the inhibition of acetylcholinesterase (AChE) activity. In fact the k_i values did not discriminate the S and Rdfb strains, while the Raz strain exhibited a 1.7-fold and a 14-fold increase in k_i value compared to the S strain for azinphos-methyl oxon and carbaryl, respectively. To verify this hypothesis, two cloned AChE cDNAs sequences (named *cydpom-ace2* e *cydpom-ace1*) were compared between the susceptible and the resistant strains. No difference in the deduced amino acid sequence was found in *cydpom-ace2* (orthologous to the *Drosophila melanogaster* AChE). In the putative *cydpom-ace1* (paralogous to the *Drosophila* AChE), a single amino acid substitution F399V was exclusively present in the Raz strain. The F399 lined the active site of the enzyme and the F399V substitution likely could influence the accessibility of different types of inhibitors to the catalytic site of the insensitive *cydpom-ace1*.

Additional References

Genotype to phenotype, the molecular and physiological dimensions of resistance in arthropods. (2015) (<https://pubmed.ncbi.nlm.nih.gov/26047113>)

RELATED GEPHE

Related Genes

1 (para (kdr)) (<https://www.gephebase.org/search-criteria?/or+Taxon+ID=~82600~/and+Trait=Xenobiotic+resistance/and+groupHaplotypes=true#gephebase-summary-title>)

Related Haplotypes

No matches found.

EXTERNAL LINKS

COMMENTS

