

GEPHE SUMMARY

	Gephebase Gene		GepheID
esterase isozyme E7 = E3 ( <a href="https://www.gephebase.org/search-criteria?/and+Gene">https://www.gephebase.org/search-criteria?/and+Gene</a> )		GP00000299	
Gephebase="esterase isozyme E7 = E3" #gephebase-summary-title)			Main curator
	Entry Status	Martin	
Published			

PHENOTYPIC CHANGE

	Trait Category	
Physiology ( <a href="https://www.gephebase.org/search-criteria?/and+Trait">https://www.gephebase.org/search-criteria?/and+Trait</a> )		
Category="Physiology" #gephebase-summary-title)		
	Trait	
Xenobiotic resistance (insecticide) ( <a "="" href="https://www.gephebase.org/search-criteria?/and+Trait=Xenobiotic+resistance+(insecticide)">https://www.gephebase.org/search-criteria?/and+Trait=Xenobiotic resistance (insecticide)</a> )		
criteria="Xenobiotic resistance (insecticide)" #gephebase-summary-title)		
	Trait State in Taxon A	
Musca domestica - susceptible strain		
	Trait State in Taxon B	
Musca domestica - Rutgers - resistant strain		
	Ancestral State	
Taxon A		
	Taxonomic Status	
Intraspecific ( <a href="https://www.gephebase.org/search-criteria?/and+Taxonomic">https://www.gephebase.org/search-criteria?/and+Taxonomic</a> )		
Status="Intraspecific" #gephebase-summary-title)		

Taxon A	Latin Name	Taxon B	Latin Name
Musca domestica		Musca domestica	
( <a "="" href="https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=Musca+domestica">https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms="Musca domestica"</a> #gephebase-summary-title)		( <a "="" href="https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=Musca+domestica">https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms="Musca domestica"</a> #gephebase-summary-title)	
	Common Name		Common Name
house fly		house fly	
	Synonyms		Synonyms
house fly; Musca domestica Linnaeus, 1758		house fly; Musca domestica Linnaeus, 1758	
	Rank		Rank
species		species	
	Lineage		Lineage
cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Protostomia; Ecdysozoa; Panarthropoda; Arthropoda; Mandibulata; Pancrustacea; Hexapoda; Insecta; Dicondylia; Pterygota; Neoptera; Holometabola; Diptera; Brachycera; Muscomorpha; Eremoneura; Cyclorrhapha; Schizophora; Calypratae; Muscoidea; Muscidae; Muscinae; Muscini; Musca; Musca		cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Protostomia; Ecdysozoa; Panarthropoda; Arthropoda; Mandibulata; Pancrustacea; Hexapoda; Insecta; Dicondylia; Pterygota; Neoptera; Holometabola; Diptera; Brachycera; Muscomorpha; Eremoneura; Cyclorrhapha; Schizophora; Calypratae; Muscoidea; Muscidae; Muscinae; Muscini; Musca; Musca	
	Parent		Parent
Musca () - (Rank: subgenus)		Musca () - (Rank: subgenus)	
( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=44052">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=44052</a> )		( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=44052">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=44052</a> )	
	NCBI Taxonomy ID		NCBI Taxonomy ID
7370		7370	
( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=7370">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=7370</a> )		( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=7370">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=7370</a> )	
	is Taxon A an Infrappecies?		is Taxon B an Infrappecies?
No		Yes	
			Taxon B Description
			Musca domestica - Rutgers - resistant strain

GENOTYPIC CHANGE

	Generic Gene Name		UniProtKB Lucilia cuprina
LcaE7		Q25252 ( <a href="http://www.uniprot.org/uniprot/Q25252">http://www.uniprot.org/uniprot/Q25252</a> )	
	Synonyms		GenebankID or UniProtKB
-		0	
	String		
-			
	Sequence Similarities		
Belongs to the type-B carboxylesterase/lipase family.			
	GO - Molecular Function		
GO:0016787 : hydrolase activity ( <a href="https://www.ebi.ac.uk/QuickGO/term/GO:0016787">https://www.ebi.ac.uk/QuickGO/term/GO:0016787</a> )			
	GO - Biological Process		
-			
	GO - Cellular Component		
-			
			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

Gly137Asp

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

The same amino acid substitution in orthologous esterases confers organophosphate resistance on the house fly and a blowfly. (1999) (<https://pubmed.ncbi.nlm.nih.gov/10451921>)

Authors

Claudianos C; Russell RJ; Oakeshott JG

Abstract

Organophosphate (OP) insecticide resistance in certain strains of *Musca domestica* is associated with reduction in the carboxylesterase activity of a particular esterase isozyme. This has been attributed to a 'mutant ali-esterase hypothesis', which invokes a structural mutation to an ali-esterase resulting in the loss of its carboxylesterase activity but acquisition of OP hydrolase activity. It has been shown that the mutation in *Lucilia cuprina* is a Gly137-->Asp substitution in the active site of an esterase encoded by the Lc alpha E7 gene (Newcomb, R.D., Campbell, P.M., Ollis, D.L., Cheah, E., Russell, R.J., Oakeshott, J.G., 1997. A single amino acid substitution converts a carboxylesterase to an organophosphate hydrolase and confers insecticide resistance on a blowfly. *Proc. Natl. Acad. Sci. USA* 94, 7464-7468). We now report the cloning and characterisation of the orthologous *M. domestica* Md alpha E7 gene, including the sequencing of cDNAs from the OP resistant Rutgers and OP susceptible sbo and WHO strains. The Md alpha E7 gene has the same intron structure as Lc alpha E7 and encodes a protein with 76% amino acid identity to Lc alpha E7. Comparisons between susceptible and resistance alleles show resistance in *M. domestica* is associated with the same Gly137-->Asp mutation as in *L. cuprina*. Bacterial expression of the Rutgers allele shows its product has OP hydrolase activity. The data indicate identical catalytic mechanisms have evolved in orthologous Md alpha E7 and Lc alpha E7 molecules to endow diazinon-type resistance on the two species of higher Diptera.

Additional References

## RELATED GEPHE

Related Genes

4 (Acetylcholinesterase (Ace), CYP6D1, para (kdr), resistance to dieldrin) (<https://www.gephebase.org/search-criteria?/or+Taxon ID=^7370^/and+Trait=Xenobiotic resistance/and+groupHaplotypes=true#gephebase-summary-title>)

Related Haplotypes

No matches found.

## EXTERNAL LINKS

## COMMENTS