

## GEPHE SUMMARY

	Gephebase Gene		GepheID
Acetylcholinesterase (Ace-2) ( <a href="https://www.gephebase.org/search-criteria?/and+Gene">https://www.gephebase.org/search-criteria?/and+Gene</a> )		GP00002012	
Gephebase="Acetylcholinesterase (Ace-2)"#gephebase-summary-title)			Main curator
Published	Entry Status	Courtier	

## 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 #gephebase-summary-title"="" href="https://www.gephebase.org/search-criteria?/and+Trait=Xenobiotic+resistance+(insecticide)">https://www.gephebase.org/search-criteria?/and+Trait=Xenobiotic+resistance+(insecticide)"#gephebase-summary-title</a> )			
	Trait State in Taxon A		
Drosophila melanogaster - sensitive			
	Trait State in Taxon B		
Drosophila melanogaster - resistant - Pierrefeu 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		Taxon B	
	Latin Name		Latin Name
Drosophila melanogaster		Drosophila melanogaster	
( <a #gephebase-summary-title"="" href="https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=Drosophila+melanogaster">https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=Drosophila+melanogaster"#gephebase-summary-title</a> )		( <a #gephebase-summary-title"="" href="https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=Drosophila+melanogaster">https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=Drosophila+melanogaster"#gephebase-summary-title</a> )	
	Common Name		Common Name
fruit fly		fruit fly	
	Synonyms		Synonyms
Sophophora melanogaster; fruit fly; Drosophila melanogaster Meigen, 1830; Sophophora melanogaster (Meigen, 1830); Drosophila melangaster		Sophophora melanogaster; fruit fly; Drosophila melanogaster Meigen, 1830; Sophophora melanogaster (Meigen, 1830); Drosophila melangaster	
	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; Acalyptratae; Ephydroidea; Drosophilidae; Drosophilinae; Drosophilini; Drosophila; Sophophora; melanogaster group; melanogaster subgroup		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; Acalyptratae; Ephydroidea; Drosophilidae; Drosophilinae; Drosophilini; Drosophila; Sophophora; melanogaster group; melanogaster subgroup	
	Parent		Parent
melanogaster subgroup () - (Rank: species subgroup)		melanogaster subgroup () - (Rank: species subgroup)	
( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=32351">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=32351</a> )		( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=32351">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=32351</a> )	
	NCBI Taxonomy ID		NCBI Taxonomy ID
7227		7227	
( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=7227">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=7227</a> )		( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=7227">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=7227</a> )	
	is Taxon A an Intraspecies?		is Taxon B an Intraspecies?
No		Yes	
			Taxon B Description
		Pierrefeu strain	

## GENOTYPIC CHANGE

	Generic Gene Name		UniProtKB Drosophila melanogaster
Ace		P07140 ( <a href="http://www.uniprot.org/uniprot/P07140">http://www.uniprot.org/uniprot/P07140</a> )	
	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			
( <a href="http://string-db.org/newstring.cgi/show_network_section.pl?identifier=7227.FBpp0289713">http://string-db.org/newstring.cgi/show_network_section.pl?identifier=7227.FBpp0289713</a> )			
	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](https://www.gephebase.org/search-criteria?/and+Presumptive Null=)) Presumptive Null  
 Coding ([https://www.gephebase.org/search-criteria?/and+Molecular Type="Coding" #gephebase-summary-title](https://www.gephebase.org/search-criteria?/and+Molecular Type=)) Molecular Type  
 SNP ([https://www.gephebase.org/search-criteria?/and+Aberration Type="SNP" #gephebase-summary-title](https://www.gephebase.org/search-criteria?/and+Aberration Type=)) Aberration Type  
 Nonsynonymous SNP Coding Change  
 Ile199Thr (position 129 in the corresponding mature Torpedo AChE). Tested in vitro in *Xenopus* oocytes Molecular Details of the Mutation  
 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=)) Experimental Evidence

	Taxon A	Taxon B	Position
Codon	-	-	-
Amino-acid	Ile	Thr	129

Resistance-associated point mutations in insecticide-insensitive acetylcholinesterase. (1994) (<https://pubmed.ncbi.nlm.nih.gov/8016090>) Main Reference  
 Mutero A; Pralavorio M; Bride JM; Fournier D Authors  
 Extensive utilization of pesticides against insects provides us with a good model for studying the adaptation of a eukaryotic genome to a strong selective pressure. One mechanism of resistance is the alteration of acetylcholinesterase (EC 3.1.1.7), the molecular target for organophosphates and carbamates. Here, we report the sequence analysis of the Ace gene in several resistant field strains of *Drosophila melanogaster*. This analysis resulted in the identification of five point mutations associated with reduced sensitivities to insecticides. In some cases, several of these mutations were found to be combined in the same protein, leading to different resistance patterns. Our results suggest that recombination between resistant alleles preexisting in natural populations is a mechanism by which insects rapidly adapt to new selective pressures. Abstract  
 Additional References

## RELATED GEPHE

19 (alcohol dehydrogenase (Adh), Aldehyde dehydrogenase (Aldh), CG11699, Cyp12d1, Cyp28d1, Cyp28d1-Cyp28d2, cyp6d2, cyp6g1, glutamate-gated chloride channel (GluCl), GSS (glutathione synthetase), GSTE1-E10 cluster, kin of irre (kire), para (kdr), PHGPx, resistance to dieldrin, RnrS, SOD1, Ugt86Dd, CHKov1) ([https://www.gephebase.org/search-criteria?/or+Taxon ID="7227" /and+Trait=Xenobiotic resistance/and+groupHaplotypes=true#gephebase-summary-title](https://www.gephebase.org/search-criteria?/or+Taxon ID=)) Related Genes  
 4 ([https://www.gephebase.org/search-criteria?/or+Gene Gephebase="Acetylcholinesterase \(Ace-2\)" /and+Taxon ID="7227" /or+Gene Gephebase="Acetylcholinesterase \(Ace-2\)" /and+Taxon ID="7227" #gephebase-summary-title](https://www.gephebase.org/search-criteria?/or+Gene Gephebase=)) Related Haplotypes

## EXTERNAL LINKS

## COMMENTS

@SeveralMutationsWithEffect @Epistasis This mutation interacts with the other Ace mutations listed in GP00002011; some of which are also present in the Pierrefeu strain.