

GEPHE SUMMARY

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

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

GENOTYPIC CHANGE

	Generic Gene Name	UniProtKB Drosophila melanogaster
Ace	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	P07140 (http://www.uniprot.org/uniprot/P07140)	
7227.FBpp0289713 (http://string-db.org/newstring_cgi/show_network_section.pl?identifier=7227.FBpp0289713)	String	
Belongs to the type-B carboxylesterase/lipase family.	Sequence Similarities	
GO:0042803 : protein homodimerization activity	GO - Molecular Function	

(<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>)

		Presumptive Null
No (https://www.gephebase.org/search-criteria?/and+Presumptive Null=%22No%22#gephebase-summary-title)		Molecular Type
Coding (https://www.gephebase.org/search-criteria?/and+Molecular Type=%22Coding%22#gephebase-summary-title)		Aberration Type
SNP (https://www.gephebase.org/search-criteria?/and+Aberration Type=%22SNP%22#gephebase-summary-title)		SNP Coding Change
Nonsynonymous		Molecular Details of the Mutation
Ile199Thr (position 129 in the corresponding mature Torpedo AChE). Tested in vitro in <i>Xenopus</i> oocytes		Experimental Evidence
Candidate Gene (https://www.gephebase.org/search-criteria?/and+Experimental Evidence=%22Candidate Gene%22#gephebase-summary-title)		

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

	Main Reference
Resistance-associated point mutations in insecticide-insensitive acetylcholinesterase. (1994) (https://pubmed.ncbi.nlm.nih.gov/8016090)	Authors
Mutero A; Pralavorio M; Bride JM; Fournier D	Abstract
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 <i>Drosophila melanogaster</i> . 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.	Additional References

RELATED GEPHE

	Related Genes
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=%227227%22/and+Trait=Xenobiotic resistance/and+groupHaplotypes=true#gephebase-summary-title)	Related Haplotypes
4 (https://www.gephebase.org/search-criteria?/or+Gene Gephebase=%22Acetylcholinesterase (Ace-2)%22/and+Taxon ID=%227227%22/and+Trait=Xenobiotic resistance/and+groupHaplotypes=true#gephebase-summary-title)	

EXTERNAL LINKS

COMMENTS

