

GEPHE SUMMARY

esterase isozyme E3 (https://www.gephebase.org/search-criteria?/and+Gene Gephebase="esterase isozyme E3" #gephebase-summary-title)	Gephebase Gene	GP00000297	GepheID
Published	Entry Status	Martin	Main curator

PHENOTYPIC CHANGE

Physiology (https://www.gephebase.org/search-criteria?/and+Trait Category="Physiology" #gephebase-summary-title)	Trait Category		
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)	Trait		
Lucilia sericata - susceptible	Trait State in Taxon A		
Lucilia sericata - resistant	Trait State in Taxon B		
Taxon A	Ancestral State		
Intraspecific (https://www.gephebase.org/search-criteria?/and+Taxonomic Status="Intraspecific" #gephebase-summary-title)	Taxonomic Status		
	Taxon A	Taxon B	
Lucilia sericata (<a #gephebase-summary-title"="" href="https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=Lucilia+sericata">https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=Lucilia+sericata" #gephebase-summary-title)	Latin Name	Lucilia sericata (<a #gephebase-summary-title"="" href="https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=Lucilia+sericata">https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=Lucilia+sericata" #gephebase-summary-title)	Latin Name
common green bottle fly	Common Name	common green bottle fly	Common Name
Phaenicia sericata; common green bottle fly; sheep blowfly; Lucilia sericata (Meigen, 1826)	Synonyms	Phaenicia sericata; common green bottle fly; sheep blowfly; Lucilia sericata (Meigen, 1826)	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; Calypratae; Oestroidea; Calliphoridae; Luciliinae; Lucilia	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; Oestroidea; Calliphoridae; Luciliinae; Lucilia	Lineage
Lucilia () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=7374)	Parent	Lucilia () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=7374)	Parent
13632 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=13632)	NCBI Taxonomy ID	13632 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=13632)	NCBI Taxonomy ID
No	is Taxon A an Intraspecies?	No	is Taxon B an Intraspecies?

GENOTYPIC CHANGE

LcaE7	Generic Gene Name	Q25252 (http://www.uniprot.org/uniprot/Q25252)	UniProtKB Lucilia cuprina
-	Synonyms	()	GenebankID or UniProtKB
-	String		
Belongs to the type-B carboxylesterase/lipase family.	Sequence Similarities		
GO:0016787 : hydrolase activity (https://www.ebi.ac.uk/QuickGO/term/GO:0016787)	GO - Molecular Function		
-	GO - Biological Process		
-	GO - Cellular Component		
No (<a #gephebase-summary-title"="" href="https://www.gephebase.org/search-criteria?/and+Presumptive+Null=No">https://www.gephebase.org/search-criteria?/and+Presumptive+Null=No" #gephebase-summary-title)			Presumptive Null
			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

Trp251Ser

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

Amplification of DNA from preserved specimens shows blowflies were preadapted for the rapid evolution of insecticide resistance. (2006) (<https://pubmed.ncbi.nlm.nih.gov/16723400>)

Authors

Hartley CJ; Newcomb RD; Russell RJ; Yong CG; Stevens JR; Yeates DK; La Salle J; Oakeshott JG

Abstract

Mutations of esterase 3 confer two forms of organophosphate resistance on contemporary Australasian *Lucilia cuprina*. One form, called diazinon resistance, is slightly more effective against commonly used insecticides and is now more prevalent than the other form, called malathion resistance. We report here that the single amino acid replacement associated with diazinon resistance and two replacements associated with malathion resistance also occur in esterase 3 in the sibling species *Lucilia sericata*, suggesting convergent evolution around a finite set of resistance options. We also find parallels between the species in the geographic distributions of the polymorphisms: In both cases, the diazinon-resistance change is absent or rare outside Australasia where insecticide pressure is lower, whereas the changes associated with malathion resistance are widespread. Furthermore, PCR analysis of pinned specimens of Australasian *L. cuprina* collected before the release of organophosphate insecticides reveals no cases of the diazinon-resistance change but several cases of those associated with malathion resistance. Thus, the early outbreak of resistance in this species can be explained by the preexistence of mutant alleles encoding malathion resistance. The pinned specimen analysis also shows much higher genetic diversity at the locus before organophosphate use, suggesting that the subsequent sweep of diazinon resistance in Australasia has compromised the scope for the locus to respond further to the ongoing challenge of the insecticides.

Additional References

RELATED GEPHE

Related Genes

No matches found.

Related Haplotypes

2 (<https://www.gephebase.org/search-criteria?/or+Gene+Gephebase=~esterase+isozyme+E3^/and+Taxon+ID=~13632^/or+Gene+Gephebase=~esterase+isozyme+E3^/and+Taxon+ID=~13632^#gephebase-summary-title>)

EXTERNAL LINKS

COMMENTS