GEPHE SUMMARY

Gephebase Gene
esterase isozyme E3 (https://www.gephebase.org/search-criteria?/and+Gene Gephebase=^esterase isozyme E3^#gephebase-summary-title)

GepheID
GP00000297

Entry Status
Published

Main curator
Martin

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 State in Taxon A
Lucilia sericata - susceptible

Trait State in Taxon B
Lucilia sericata - resistant

Ancestral State
Taxon A

Taxonomic Status
Intraspecific (https://www.gephebase.org/search-criteria?/and+Taxonomic Status=^Intraspecific^#gephebase-summary-title)

Taxon A

Latin Name
Lucilia sericata (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=^Lucilia sericata^#gephebase-summary-title)

Common Name
common green bottle fly

Synonyms
Phaenicia sericata; common green bottle fly; sheep blowfly; Lucilia sericata (Meigen, 1826)

Rank
species

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; Calyptratae; Oestroidea; Calliphoridae; Luciliinae; Lucilia

Parent
Lucilia () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 7374)

NCBI Taxonomy ID
13632 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 13632)

is Taxon A an Infraspecies?
No

Taxon B

Latin Name
Lucilia sericata (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=^Lucilia sericata^#gephebase-summary-title)

Common Name
common green bottle fly

Synonyms
Phaenicia sericata; common green bottle fly; sheep blowfly; Lucilia sericata (Meigen, 1826)

Rank
species

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; Calyptratae; Oestroidea; Calliphoridae; Luciliinae; Lucilia

Parent
Lucilia () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 7374)

NCBI Taxonomy ID
13632 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 13632)

is Taxon B an Infraspecies?
No

GENOTYPIC CHANGE

Generic Gene Name
LcaE7

Synonyms
-

String
-

Sequence Similarities
Belongs to the type-B carboxylesterase/lipase family.

GO - Molecular Function
GO:0016787 : hydrolase activity (https://www.ebi.ac.uk/QuickGO/term/GO:0016787)

GO - Biological Process
-

GO - Cellular Component
-

UniProtKB Lucilia cuprina
Q25252 (http://www.uniprot.org/uniprot/Q25252)

GenebankID or UniProtKB
()

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

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