GEPHE SUMMARY

Gephebase Gene
cyp6g1

GephelD
GP00002019

Entry Status
Published

Main curator
Courtier

PHENOTYPIC CHANGE

Trait Category
Physiology

Trait
Xenobiotic resistance (insecticide)

Trait State in Taxon A
Drosophila simulans - susceptible

Trait State in Taxon B
Drosophila simulans - resistant

Ancestral State
Taxon A

Taxonomic Status
Intraspecific

Taxon A

Latin Name
Drosophila simulans

Common Name
-

Synonyms
-

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; Acalyptratae; Ephydroidea; Drosophilidae; Drosophilinae; Drosophilini; Drosophila; Sophophora; melanogaster group; melanogaster subgroup

Parent
melanogaster subgroup () - (Rank: species subgroup)

NCBI Taxonomy ID
7240

is Taxon A an Infraspecies?
No

Taxon B

Latin Name
Drosophila simulans

Common Name
-

Synonyms
-

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; Acalyptratae; Ephydroidea; Drosophilidae; Drosophilinae; Drosophilini; Drosophila; Sophophora; melanogaster group; melanogaster subgroup

Parent
melanogaster subgroup () - (Rank: species subgroup)

NCBI Taxonomy ID
7240

is Taxon B an Infraspecies?
Yes

Taxon B Description
California population

GENOTYPIC CHANGE

Generic Gene Name
Cyp6g1

Synonyms
6g1; anon-WO03025223.16; anon-WO03025223.17; CG8453; Cyp6-like; cyp6g1; Cyp6G1; CYP6g1; CYP6G1; Cyp6gl; DDT-R; Dmel-Cyp6g1; Dmel\CG8453; RDDT; Rl; Rl[DDT]; Rl[II]; Rst(2)DDT; CYP6-like

String
7227.FBpp0087100

Sequence Similarities
Belongs to the cytochrome P450 family.

GO - Molecular Function
GO:0020037 : heme binding
GO:0005506 : iron ion binding
GO:0004497 : monooxygenase activity
GO:0016705 : oxidoreductase activity, acting on paired donors, with incorporation or reduction

UniProtKB Drosophila melanogaster
Q9V674

GenebankID or UniProtKB

of molecular oxygen

GO - Biological Process
GO:0046680 : response to DDT
GO:0017085 : response to insecticide
GO:0046701 : insecticide catabolic process
GO:0046689 : response to mercury ion
GO:0046683 : response to organophosphorus

GO - Cellular Component
GO:0005789 : endoplasmic reticulum membrane
GO:0031090 : organelle membrane

Presumptive Null
No

Molecular Type
Cis-regulatory

Aberration Type
Insertion

Insertion Size
1-10 kb

Molecular Details of the Mutation
insertion of a Doc transposable element around 200 bp upstream of the putative transcription start site - mutation associated with increased expression of the gene

Experimental Evidence
Candidate Gene

Main Reference
Strong selective sweep associated with a transposon insertion in Drosophila simulans. (2004)

Authors
Schlenke TA; Begun DJ

Abstract
We know little about several important properties of beneficial mutations, including their mutational origin, their phenotypic effects (e.g., protein structure changes vs. regulatory changes), and the frequency and rapidity with which they become fixed in a population. One signature of the spread of beneficial mutations is the reduction of heterozygosity at linked sites. Here, we present population genetic data from several loci across chromosome arm 2R in Drosophila simulans. A 100-kb segment from a freely recombining region of this chromosome shows extremely reduced heterozygosity in a California population sample, yet typical levels of divergence between species, suggesting that at least one episode of strong directional selection has occurred in the region. The 5′ flanking sequence of one gene in this region, Cyp6g1 (a cytochrome P450), is nearly fixed for a Doc transposable element insertion. Presence of the insertion is correlated with increased transcript abundance of Cyp6g1, a phenotype previously shown to be associated with insecticide resistance in Drosophila melanogaster. Surveys of nucleotide variation in the same genomic region in an African D. simulans population revealed no evidence for a high-frequency Doc element and no evidence for reduced polymorphism. These data are consistent with the notion that the Doc element is a geographically restricted beneficial mutation. Data from D. simulans Cyp6g1 are paralleled in many respects by data from its sister species D. melanogaster.

Additional References

RELATED GEPHE

Related Genes
1 (resistance to dieldrin)
Related Haplotypes
1

COMMENTS

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