GEPHE SUMMARY

Gephebase Gene

cyp6g1 (https://www.gephebase.org/search-criteria?/and+Gene Gephebase=^cyp6g1^#gephebase-summary-title)

GepheID

GP00002020

Entry Status

Published

Main curator

Courtier

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

Drosophila simulans - susceptible

Trait State in Taxon B

Drosophila simulans - 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

Drosophila simulans (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=^Drosophila simulans^#gephebase-summary-title)

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) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 32351)

NCBI Taxonomy ID

7240 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 7240)

is Taxon A an Infraspecies?

No

Taxon B

Latin Name

Drosophila simulans (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=^Drosophila simulans^#gephebase-summary-title)

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) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 32351)

NCBI Taxonomy ID

7240 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 7240)

is Taxon B an Infraspecies?

Yes

Taxon B Description

Rhone Valley 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 (http://string-db.org/newstring_cgi/show_network_section.pl?identifier= 7227.FBpp0087100)

Sequence Similarities

Belongs to the cytochrome P450 family.

GO - Molecular Function

GO:0020037 : heme binding (https://www.ebi.ac.uk/QuickGO/term/GO:0020037)

UniProtKB Drosophila melanogaster

Q9V674 (http://www.uniprot.org/uniprot/Q9V674)

GenebankID or UniProtKB

()

GO:0005506 : iron ion binding (https://www.ebi.ac.uk/QuickGO/term/GO:0005506)
GO:0004497 : monooxygenase activity
(https://www.ebi.ac.uk/QuickGO/term/GO:0004497)
GO:0016705 : oxidoreductase activity, acting on paired donors, with incorporation or
reduction of molecular oxygen (https://www.ebi.ac.uk/QuickGO/term/GO:0016705)

GO - Biological Process

GO:0046680 : response to DDT (https://www.ebi.ac.uk/QuickGO/term/GO:0046680)
GO:0017085 : response to insecticide (https://www.ebi.ac.uk/QuickGO/term/GO:0017085)
GO:0046701 : insecticide catabolic process
(https://www.ebi.ac.uk/QuickGO/term/GO:0046701)
GO:0046689 : response to mercury ion
(https://www.ebi.ac.uk/QuickGO/term/GO:0046689)
GO:0046683 : response to organophosphorus
(https://www.ebi.ac.uk/QuickGO/term/GO:0046683)

GO - Cellular Component

GO:0005789 : endoplasmic reticulum membrane
(https://www.ebi.ac.uk/QuickGO/term/GO:0005789)
GO:0031090 : organelle membrane (https://www.ebi.ac.uk/QuickGO/term/GO:0031090)

Presumptive Null

No (https://www.gephebase.org/search-criteria?/and+Presumptive Null=^No^#gephebase-summary-title)

Molecular Type

Cis-regulatory (https://www.gephebase.org/search-criteria?/and+Molecular Type=^Cis-regulatory^#gephebase-summary-title)

Aberration Type

Insertion (https://www.gephebase.org/search-criteria?/and+Aberration Type=^Insertion^#gephebase-summary-title)

Insertion Size

1-10 kb

Molecular Details of the Mutation

insertion of a Juan transposable element in the regulatory sequence. The insertion is almost fixed in the RhÃ´ne Valley but barely present in Mayotte - mutation associated with increased expression of the gene

Experimental Evidence

Candidate Gene (https://www.gephebase.org/search-criteria?/and+Experimental Evidence=^Candidate Gene^#gephebase-summary-title)

Main Reference

Variation of gene expression associated with colonisation of an anthropized environment: comparison between African and European populations of Drosophila simulans. (2013) (https://pubmed.ncbi.nlm.nih.gov/24260296)

Authors

Wurmser F; Mary-Huard T; Daudin JJ; Joly D; Montchamp-Moreau C

Abstract

The comparison of transcriptome profiles among populations is a powerful tool for investigating the role of gene expression change in adaptation to new environments. In this study, we use massively parallel sequencing of 3′ cDNAs obtained from large samples of adult males, to compare a population of Drosophila simulans from a natural reserve within its ancestral range (eastern Africa) with a derived population collected in the strongly anthropized RhÃ´ne valley (France). The goal was to scan for adaptation linked to the invasion of new environments by the species. Among 15,090 genes retained for the analysis, 794 were found to be differentially expressed between the two populations. We observed an increase in expression of reproduction-related genes in eastern Africa, and an even stronger increase in expression of Cytochrome P450, Glutathione transferase and Glucuronosyl transferase genes in the derived population. These three gene families are involved in detoxification processes, which suggests that pesticides are a major environmental pressure for the species in this area. The survey of the Cyp6g1 upstream region revealed the insertion of a transposable element, Juan, in the regulatory sequence that is almost fixed in the RhÃ´ne Valley, but barely present in Mayotte. This shows that Cyp6g1 has undergone parallel evolution in derived populations of D. simulans as previously shown for D. melanogaster. The increasing amount of data produced by comparative population genomics and transcriptomics should permit the identification of additional genes associated with functional divergence among those differentially expressed.

Additional References

RELATED GEPHE

Related Genes

1 (resistance to dieldrin) (https://www.gephebase.org/search-criteria?/or+Taxon ID=^7240^/and+Trait=Xenobiotic resistance/and+groupHaplotypes=true#gephebase-summary-title)

Related Haplotypes

1 (https://www.gephebase.org/search-criteria?/or+Gene Gephebase=^cyp6g1^/and+Taxon ID=^7240^/or+Gene Gephebase=^cyp6g1^/and+Taxon ID=^7240^#gephebase-summary-title)

EXTERNAL LINKS

COMMENTS

@TE @SelectiveSweep