

GEPHE SUMMARY

Gephebase Gene

yellow

Entry Status

Published

GepheID

GP00001224

Main curator

Martin

PHENOTYPIC CHANGE

Trait Category

Morphology

Trait

Coloration (wing spot)

Trait State in Taxon A

Drosophila spp.

Trait State in Taxon B

Drosophila *mimetica*

Ancestral State

Data not curated

Taxonomic Status

Interspecific

Taxon A

Latin Name

Drosophila

Common Name

-

Synonyms

Drosophila (*Drosophila*); *Drosophila* (*Drosophila*) Fallen, 1823

Rank

subgenus

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; Acalytratae; Ephydroidea; Drosophilidae; Drosophilinae; Drosophilini; *Drosophila*

Parent

Drosophila (fruit flies) - (Rank: genus)

NCBI Taxonomy ID

32281

is Taxon A an Intraspecies?

No

Taxon B

Latin Name

Drosophila *mimetica*

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; Acalytratae; Ephydroidea; Drosophilidae; Drosophilinae; Drosophilini; *Drosophila*; Sophophora; melanogaster group; *suzukii* subgroup

Parent

suzukii subgroup () - (Rank: species subgroup)

NCBI Taxonomy ID

30038

is Taxon B an Intraspecies?

No

GENOTYPIC CHANGE

Generic Gene Name

y

Synonyms

CG3757; Dmel\CG3757; EG:125H10.2; T6; Y

String

7227.FBpp0070070

Sequence Similarities

Belongs to the major royal jelly protein family.

GO - Molecular Function

-

GO - Biological Process

GO:0042438 : melanin biosynthetic process

GO:0048082 : regulation of adult chitin-containing cuticle pigmentation

GO:0048066 : developmental pigmentation

GO:0048067 : cuticle pigmentation

GO:0006583 : melanin biosynthetic process from tyrosine

GO:0048065 : male courtship behavior, veined wing extension

GO:0060179 : male mating behavior

UniProtKB *Drosophila melanogaster*

P09957

GenebankID or UniProtKB

CAJ57653

GO - Cellular Component
GO:0005737 : cytoplasm
GO:0005576 : extracellular region
GO:0070451 : cell hair

Presumptive Null

No

Molecular Type

Cis-regulatory

Aberration Type

Unknown

Molecular Details of the Mutation

within a 740bp-element

Experimental Evidence

Candidate Gene

Main Reference

Repeated morphological evolution through cis-regulatory changes in a pleiotropic gene. (2006)

Authors

Prud'homme B; Gompel N; Rokas A; Kassner VA; Williams TM; Yeh SD; True JR; Carroll SB

Abstract

The independent evolution of morphological similarities is widespread. For simple traits, such as overall body colour, repeated transitions by means of mutations in the same gene may be common. However, for more complex traits, the possible genetic paths may be more numerous; the molecular mechanisms underlying their independent origins and the extent to which they are constrained to follow certain genetic paths are largely unknown. Here we show that a male wing pigmentation pattern involved in courtship display has been gained and lost multiple times in a *Drosophila* clade. Each of the cases we have analysed (two gains and two losses) involved regulatory changes at the pleiotropic pigmentation gene *yellow*. Losses involved the parallel inactivation of the same cis-regulatory element (CRE), with changes at a few nucleotides sufficient to account for the functional divergence of one element between two sibling species. Surprisingly, two independent gains of wing spots resulted from the co-option of distinct ancestral CREs. These results demonstrate how the functional diversification of the modular CREs of pleiotropic genes contributes to evolutionary novelty and the independent evolution of morphological similarities.

Additional References

RELATED GEPHE

Related Genes

5 (*Dat*, Dopamine N-acetyltransferase (*Dat*), *ebony*, *tan*, *wingless* (*wg*))

Related Haplotypes

3

COMMENTS