GEPHE SUMMARY

Gephebase Gene
yellow

GephelD
GP00001224

Entry Status
Published

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; Acalyptratae; Ephydroidea; Drosophilidae; Drosophilinae; Drosophilini; Drosophila

Parent
Drosophila (fruit flies) - (Rank: genus)

NCBI Taxonomy ID
32281

is Taxon A an Infraspecies?
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; Acalyptratae; Ephydroidea; Drosophilidae; Drosophilinae; Drosophilini; Drosophila; Sophophora; melanogaster group; suzukii subgroup

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

NCBI Taxonomy ID
30038

is Taxon B an Infraspecies?
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

EXTERNAL LINKS

COMMENTS