GEPHE SUMMARY

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

GepheID
GP00001224

Entry Status
Published

Main curator
Martin

PHENOTYPIC CHANGE

Trait Category
Morphology (https://www.gephebase.org/search-criteria?/and+Trait Category=^Morphology^#gephebase-summary-title)

Trait
Coloration (wing spot) (https://www.gephebase.org/search-criteria?/and+Trait=^Coloration (wing spot)^#gephebase-summary-title)

Trait State in Taxon A
Drosophila spp.

Trait State in Taxon B
Drosophila mimetica

Ancestral State
Data not curated

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

Taxon A

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

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) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 7215)

NCBI Taxonomy ID
32281 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 32281)

is Taxon A an Infraspecies?
No

Taxon B

Latin Name
Drosophila mimetica (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=^Drosophila mimetica^#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; suzukii subgroup

Parent
suzukii subgroup () - (Rank: species subgroup) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 32353)

NCBI Taxonomy ID
30038 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?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 (http://string-db.org/newstring_cgi/show_network_section.pl?identifier= 7227.FBpp0070070)

Sequence Similarities
Belongs to the major royal jelly protein family.

GO - Molecular Function
-

GO - Biological Process
GO:0042438 : melanin biosynthetic process (https://www.ebi.ac.uk/QuickGO/term/GO:0042438)
GO:0048082 : regulation of adult chitin-containing cuticle pigmentation (https://www.ebi.ac.uk/QuickGO/term/GO:0048082)

UniProtKB Drosophila melanogaster
P09957 (http://www.uniprot.org/uniprot/P09957)

GenebankID or UniProtKB
CAJ57653 (https://www.ncbi.nlm.nih.gov/nuccore/CAJ57653)

GO:0048066 : developmental pigmentation (https://www.ebi.ac.uk/QuickGO/term/GO:0048066)
GO:0048067 : cuticle pigmentation (https://www.ebi.ac.uk/QuickGO/term/GO:0048067)
GO:0006583 : melanin biosynthetic process from tyrosine (https://www.ebi.ac.uk/QuickGO/term/GO:0006583)
GO:0048065 : male courtship behavior, veined wing extension (https://www.ebi.ac.uk/QuickGO/term/GO:0048065)
GO:0060179 : male mating behavior (https://www.ebi.ac.uk/QuickGO/term/GO:0060179)

GO - Cellular Component

GO:0005737 : cytoplasm (https://www.ebi.ac.uk/QuickGO/term/GO:0005737)
GO:0005576 : extracellular region (https://www.ebi.ac.uk/QuickGO/term/GO:0005576)
GO:0070451 : cell hair (https://www.ebi.ac.uk/QuickGO/term/GO:0070451)

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

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

Molecular Details of the Mutation

within a 740bp-element

Experimental Evidence

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

Main Reference

Repeated morphological evolution through cis-regulatory changes in a pleiotropic gene. (2006) (https://pubmed.ncbi.nlm.nih.gov/16625197)

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)) (https://www.gephebase.org/search-criteria?/or+Taxon ID=^32281^/and+Trait=Coloration/or+Taxon ID=^30038^/and+Trait=Coloration/and+groupHaplotypes=true#gephebase-summary-title)

Related Haplotypes

3 (https://www.gephebase.org/search-criteria?/or+Gene Gephebase=^yellow^/and+Taxon ID=^32281^/or+Gene Gephebase=^yellow^/and+Taxon ID=^30038^#gephebase-summary-title)

EXTERNAL LINKS

COMMENTS