GEPHE SUMMARY

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

GepheID
GP00001222

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 biarmipes

Ancestral State
Taxon A

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 biarmipes (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=^Drosophila biarmipes^#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
125945 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 125945)

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
AAW32907 (https://www.ncbi.nlm.nih.gov/nuccore/AAW32907)

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

wing spot activator element; within a 196bp fragment; sequences required for activation in the spot are located within or overlap with bp 425-453

Experimental Evidence

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

Main Reference

Chance caught on the wing: cis-regulatory evolution and the origin of pigment patterns in Drosophila. (2005) (https://pubmed.ncbi.nlm.nih.gov/15690032)

Authors

Gompel N; Prud'homme B; Wittkopp PJ; Kassner VA; Carroll SB

Abstract

The gain, loss or modification of morphological traits is generally associated with changes in gene regulation during development. However, the molecular bases underlying these evolutionary changes have remained elusive. Here we identify one of the molecular mechanisms that contributes to the evolutionary gain of a male-specific wing pigmentation spot in Drosophila biarmipes, a species closely related to Drosophila melanogaster. We show that the evolution of this spot involved modifications of an ancestral cis-regulatory element of the yellow pigmentation gene. This element has gained multiple binding sites for transcription factors that are deeply conserved components of the regulatory landscape controlling wing development, including the selector protein Engrailed. The evolutionary stability of components of regulatory landscapes, which can be co-opted by chance mutations in cis-regulatory elements, might explain the repeated evolution of similar morphological patterns, such as wing pigmentation patterns in flies.

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=^125945^/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=^125945^#gephebase-summary-title)

EXTERNAL LINKS

COMMENTS