GEPHE SUMMARY

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

GepheID
GP00001100

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

Trait State in Taxon A
dark posterior male abdomen

Trait State in Taxon B
light posterior male abdomen

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

Common Name
-

Synonyms
Drosophila yakuba Burla, 1954

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
7245 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 7245)

is Taxon A an Infraspecies?
No

Taxon B

Latin Name
Drosophila santomea (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=^Drosophila santomea^#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
129105 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 129105)

is Taxon B an Infraspecies?
No

GENOTYPIC CHANGE

Generic Gene Name
t

Synonyms
CG12120; Dmel\CG12120; Tan; tan; Dmel_CG12120

String
-

Sequence Similarities
-

GO - Molecular Function
GO:0016787 : hydrolase activity (https://www.ebi.ac.uk/QuickGO/term/GO:0016787)
GO:0003832 : beta-alanyl-dopamine hydrolase activity (https://www.ebi.ac.uk/QuickGO/term/GO:0003832)
GO:0031964 : beta-alanyl-histamine hydrolase activity (https://www.ebi.ac.uk/QuickGO/term/GO:0031964)

GO - Biological Process
GO:0048085 : adult chitin-containing cuticle pigmentation

UniProtKB Drosophila melanogaster
Q9W369 (http://www.uniprot.org/uniprot/Q9W369)

GenebankID or UniProtKB
ACA49238 (https://www.ncbi.nlm.nih.gov/nuccore/ACA49238)

(https://www.ebi.ac.uk/QuickGO/term/GO:0048085)
GO:0048067 : cuticle pigmentation (https://www.ebi.ac.uk/QuickGO/term/GO:0048067)
GO:0001692 : histamine metabolic process
(https://www.ebi.ac.uk/QuickGO/term/GO:0001692)
GO:0007601 : visual perception (https://www.ebi.ac.uk/QuickGO/term/GO:0007601)
GO:0042416 : dopamine biosynthetic process
(https://www.ebi.ac.uk/QuickGO/term/GO:0042416)
GO:0001694 : histamine biosynthetic process
(https://www.ebi.ac.uk/QuickGO/term/GO:0001694)

GO - Cellular Component

GO:0005829 : cytosol (https://www.ebi.ac.uk/QuickGO/term/GO:0005829)

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

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

Deletion Size

10-99 bp

Molecular Details of the Mutation

san MSE del30 (30bp deletion)

Experimental Evidence

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

Main Reference

The evolution of gene regulation underlies a morphological difference between two Drosophila sister species. (2008) (https://pubmed.ncbi.nlm.nih.gov/18329365)

Authors

Jeong S; Rebeiz M; Andolfatto P; Werner T; True J; Carroll SB

Abstract

Understanding the mechanisms underlying the morphological divergence of species is one of the central goals of evolutionary biology. Here, we analyze the genetic and molecular bases of the divergence of body pigmentation patterns between Drosophila yakuba and its sister species Drosophila santomea. We found that loss of pigmentation in D. santomea involved the selective loss of expression of the tan and yellow pigmentation genes. We demonstrate that tan gene expression was eliminated through the mutational inactivation of one specific tan cis-regulatory element (CRE) whereas the Tan protein sequence remained unchanged. Surprisingly, we identify three independent loss-of-function alleles of the tan CRE in the young D. santomea lineage. We submit that there is sufficient empirical evidence to support the general prediction that functional evolutionary changes at pleiotropic loci will most often involve mutations in their discrete, modular cis-regulatory elements.

Additional References

Evolution of the tan locus contributed to pigment loss in Drosophila santomea: a response to Matute et al. (2009) (https://pubmed.ncbi.nlm.nih.gov/20005811)

RELATED GEPHE

Related Genes

5 (Abdominal-B, ebony, pdm3, yellow, bab) (https://www.gephebase.org/search-criteria?/or+Taxon ID=^7245^/and+Trait=Coloration/or+Taxon ID=^129105^/and+Trait=Coloration/and+groupHaplotypes=true#gephebase-summary-title)

Related Haplotypes

2 (https://www.gephebase.org/search-criteria?/or+Gene Gephebase=^tan^/and+Taxon ID=^7245^/or+Gene Gephebase=^tan^/and+Taxon ID=^129105^#gephebase-summary-title)

EXTERNAL LINKS

COMMENTS

@SexualTrait Soft sweep