

GEPHE SUMMARY

|                                                                                                                                                                                                               |                |            |              |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|------------|--------------|
|                                                                                                                                                                                                               | Gephebase Gene |            | GepheID      |
| tan ( <a href="https://www.gephebase.org/search-criteria?/and+Gene+Gephebase=~tan^#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Gene+Gephebase=~tan^#gephebase-summary-title</a> ) |                | GP00001099 |              |
|                                                                                                                                                                                                               | Entry Status   | Martin     | Main curator |
| Published                                                                                                                                                                                                     |                |            |              |

PHENOTYPIC CHANGE

|                                                                                                                                                                                                                                                                                                                                                                                                                                               |                             |                                                                                                                                                                                                                                                                                                                                                                                                                                               |                             |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|
|                                                                                                                                                                                                                                                                                                                                                                                                                                               | Trait Category              |                                                                                                                                                                                                                                                                                                                                                                                                                                               |                             |
| Morphology ( <a href="https://www.gephebase.org/search-criteria?/and+Trait+Category=~Morphology^#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Trait+Category=~Morphology^#gephebase-summary-title</a> )                                                                                                                                                                                                            |                             | Trait                                                                                                                                                                                                                                                                                                                                                                                                                                         |                             |
| Coloration (abdomen; male) ( <a href="https://www.gephebase.org/search-criteria?/and+Trait=~Coloration+abdomen;+male^#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Trait=~Coloration+abdomen;+male^#gephebase-summary-title</a> )                                                                                                                                                                                  |                             | 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 ( <a href="https://www.gephebase.org/search-criteria?/and+Taxonomic+Status=~Interspecific^#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Taxonomic+Status=~Interspecific^#gephebase-summary-title</a> )                                                                                                                                                                                               |                             |                                                                                                                                                                                                                                                                                                                                                                                                                                               |                             |
|                                                                                                                                                                                                                                                                                                                                                                                                                                               | Taxon A                     |                                                                                                                                                                                                                                                                                                                                                                                                                                               | Taxon B                     |
|                                                                                                                                                                                                                                                                                                                                                                                                                                               | Latin Name                  |                                                                                                                                                                                                                                                                                                                                                                                                                                               | Latin Name                  |
| Drosophila yakuba ( <a href="https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=~Drosophila+yakuba^#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=~Drosophila+yakuba^#gephebase-summary-title</a> )                                                                                                                                                                               |                             | Drosophila santomea ( <a href="https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=~Drosophila+santomea^#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=~Drosophila+santomea^#gephebase-summary-title</a> )                                                                                                                                                                         |                             |
| -                                                                                                                                                                                                                                                                                                                                                                                                                                             | Common Name                 | -                                                                                                                                                                                                                                                                                                                                                                                                                                             | Common Name                 |
| -                                                                                                                                                                                                                                                                                                                                                                                                                                             | Synonyms                    | -                                                                                                                                                                                                                                                                                                                                                                                                                                             | Synonyms                    |
| Drosophila yakuba Burla, 1954                                                                                                                                                                                                                                                                                                                                                                                                                 |                             | -                                                                                                                                                                                                                                                                                                                                                                                                                                             |                             |
| species                                                                                                                                                                                                                                                                                                                                                                                                                                       | Rank                        | species                                                                                                                                                                                                                                                                                                                                                                                                                                       | Rank                        |
|                                                                                                                                                                                                                                                                                                                                                                                                                                               | Lineage                     |                                                                                                                                                                                                                                                                                                                                                                                                                                               | 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 |                             | 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                      |                                                                                                                                                                                                                                                                                                                                                                                                                                               | Parent                      |
| melanogaster subgroup () - (Rank: species subgroup) ( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=32351">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=32351</a> )                                                                                                                                                                                                                                     |                             | melanogaster subgroup () - (Rank: species subgroup) ( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=32351">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=32351</a> )                                                                                                                                                                                                                                     |                             |
| 7245 ( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=7245">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=7245</a> )                                                                                                                                                                                                                                                                                      | NCBI Taxonomy ID            | 129105 ( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=129105">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=129105</a> )                                                                                                                                                                                                                                                                                | NCBI Taxonomy ID            |
|                                                                                                                                                                                                                                                                                                                                                                                                                                               | is Taxon A an Intraspecies? |                                                                                                                                                                                                                                                                                                                                                                                                                                               | is Taxon B an Intraspecies? |
| No                                                                                                                                                                                                                                                                                                                                                                                                                                            |                             | No                                                                                                                                                                                                                                                                                                                                                                                                                                            |                             |

GENOTYPIC CHANGE

|                                                                                                                                                                     |                         |                                                                                                                        |                                   |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|------------------------------------------------------------------------------------------------------------------------|-----------------------------------|
|                                                                                                                                                                     | Generic Gene Name       |                                                                                                                        | UniProtKB Drosophila melanogaster |
| t                                                                                                                                                                   |                         | Q9W369 ( <a href="http://www.uniprot.org/uniprot/Q9W369">http://www.uniprot.org/uniprot/Q9W369</a> )                   |                                   |
|                                                                                                                                                                     | Synonyms                |                                                                                                                        | GenebankID or UniProtKB           |
| CG12120; Dmel\CG12120; Tan; tan; Dmel_CG12120                                                                                                                       |                         | ACA49238 ( <a href="https://www.ncbi.nlm.nih.gov/nuccore/ACA49238">https://www.ncbi.nlm.nih.gov/nuccore/ACA49238</a> ) |                                   |
| -                                                                                                                                                                   | String                  |                                                                                                                        |                                   |
| -                                                                                                                                                                   | Sequence Similarities   |                                                                                                                        |                                   |
| -                                                                                                                                                                   |                         |                                                                                                                        |                                   |
|                                                                                                                                                                     | GO - Molecular Function |                                                                                                                        |                                   |
| GO:0016787 : hydrolase activity ( <a href="https://www.ebi.ac.uk/QuickGO/term/GO:0016787">https://www.ebi.ac.uk/QuickGO/term/GO:0016787</a> )                       |                         |                                                                                                                        |                                   |
| GO:0003832 : beta-alanyl-dopamine hydrolase activity ( <a href="https://www.ebi.ac.uk/QuickGO/term/GO:0003832">https://www.ebi.ac.uk/QuickGO/term/GO:0003832</a> )  |                         |                                                                                                                        |                                   |
| GO:0031964 : beta-alanyl-histamine hydrolase activity ( <a href="https://www.ebi.ac.uk/QuickGO/term/GO:0031964">https://www.ebi.ac.uk/QuickGO/term/GO:0031964</a> ) |                         |                                                                                                                        |                                   |
|                                                                                                                                                                     | GO - Biological Process |                                                                                                                        |                                   |
| GO:0048085 : adult chitin-containing cuticle pigmentation                                                                                                           |                         |                                                                                                                        |                                   |

(<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>)

Mutation #1

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

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

Molecular Details of the Mutation

T272A - effect of the single mutation tested in reporter constructs

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>)

Mutation #2

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

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

Molecular Details of the Mutation

C323A - effect of the single mutation tested in reporter constructs

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

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Abstract

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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

@SeveralMutationsWithEffect @SexualTrait