

GEPHE SUMMARY

ebony (<a +ebony+"#gephebase-summary-title"="" href="https://www.gephebase.org/search-criteria?/and+Gene+Gephebase=">https://www.gephebase.org/search-criteria?/and+Gene+Gephebase="+ebony+"#gephebase-summary-title)	Gephebase Gene	GP00001544	GepheID
Published	Entry Status	Prigent	Main curator

PHENOTYPIC CHANGE

Morphology (<a +morphology+"#gephebase-summary-title"="" href="https://www.gephebase.org/search-criteria?/and+Trait+Category=">https://www.gephebase.org/search-criteria?/and+Trait+Category="+Morphology+"#gephebase-summary-title)	Trait Category		
Coloration (male-specific) (<a +coloration+(male-specific)+"#gephebase-summary-title"="" href="https://www.gephebase.org/search-criteria?/and+Trait=">https://www.gephebase.org/search-criteria?/and+Trait="+Coloration+(male-specific)+"#gephebase-summary-title)	Trait		
D. m. malerkotiana with darker male abdominal pigmentation	Trait State in Taxon A		
D. m. pallens with light colored male abdominal pigmentation	Trait State in Taxon B		
Unknown	Ancestral State		
Intraspecific (<a +intraspecific+"#gephebase-summary-title"="" href="https://www.gephebase.org/search-criteria?/and+Taxonomic+Status=">https://www.gephebase.org/search-criteria?/and+Taxonomic+Status="+Intraspecific+"#gephebase-summary-title)	Taxonomic Status		
	Taxon A		Taxon B
	Latin Name		Latin Name
Drosophila malerkotiana (<a +drosophila+malerkotiana+"#gephebase-summary-title"="" href="https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=">https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms="+Drosophila+malerkotiana+"#gephebase-summary-title)	Drosophila malerkotiana (<a +drosophila+malerkotiana+"#gephebase-summary-title"="" href="https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=">https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms="+Drosophila+malerkotiana+"#gephebase-summary-title)		Drosophila malerkotiana (<a +drosophila+malerkotiana+"#gephebase-summary-title"="" href="https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=">https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms="+Drosophila+malerkotiana+"#gephebase-summary-title)
-	Common Name	-	Common Name
-	Synonyms	-	Synonyms
species	Rank	species	Rank
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; Acalyptera; Ephydroidea; Drosophilidae; Drosophilinae; Drosophilini; Drosophila; Sophophora; melanogaster group; ananassae subgroup; bipectinata species complex	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; Acalyptera; Ephydroidea; Drosophilidae; Drosophilinae; Drosophilini; Drosophila; Sophophora; melanogaster group; ananassae subgroup; bipectinata species complex	Lineage
bipectinata species complex () - (Rank: no rank) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=186282)	Parent	bipectinata species complex () - (Rank: no rank) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=186282)	Parent
30036 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=30036)	NCBI Taxonomy ID	30036 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=30036)	NCBI Taxonomy ID
Yes	is Taxon A an Intraspecies?	Yes	is Taxon B an Intraspecies?
D. m. malerkotiana with darker male abdominal pigmentation	Taxon A Description	D. m. pallens with light colored male abdominal pigmentation	Taxon B Description

GENOTYPIC CHANGE

e	Generic Gene Name	UniProtKB Drosophila melanogaster
ebony; CG3331	Synonyms	O76858 (http://www.uniprot.org/uniprot/O76858)
-	String	0
-	Sequence Similarities	
	GO - Molecular Function	
GO:0000036 : acyl carrier activity (https://www.ebi.ac.uk/QuickGO/term/GO:0000036)		
GO:0003833 : beta-alanyl-dopamine synthase activity (https://www.ebi.ac.uk/QuickGO/term/GO:0003833)		
GO:0031177 : phosphopantetheine binding (https://www.ebi.ac.uk/QuickGO/term/GO:0031177)		

GO - Biological Process

- GO:0048085 : adult chitin-containing cuticle pigmentation
(<https://www.ebi.ac.uk/QuickGO/term/GO:0048085>)
- GO:0042417 : dopamine metabolic process
(<https://www.ebi.ac.uk/QuickGO/term/GO:0042417>)
- GO:0007623 : circadian rhythm (<https://www.ebi.ac.uk/QuickGO/term/GO:0007623>)
- GO:0048082 : regulation of adult chitin-containing cuticle pigmentation
(<https://www.ebi.ac.uk/QuickGO/term/GO:0048082>)
- GO:0048066 : developmental pigmentation
(<https://www.ebi.ac.uk/QuickGO/term/GO:0048066>)
- GO:0043042 : amino acid adenylation by nonribosomal peptide synthase
(<https://www.ebi.ac.uk/QuickGO/term/GO:0043042>)
- GO:0007593 : chitin-based cuticle sclerotization
(<https://www.ebi.ac.uk/QuickGO/term/GO:0007593>)
- 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:0045475 : locomotor rhythm (<https://www.ebi.ac.uk/QuickGO/term/GO:0045475>)
- GO:0006583 : melanin biosynthetic process from tyrosine
(<https://www.ebi.ac.uk/QuickGO/term/GO:0006583>)
- GO:0048022 : negative regulation of melanin biosynthetic process
(<https://www.ebi.ac.uk/QuickGO/term/GO:0048022>)
- GO:0042440 : pigment metabolic process
(<https://www.ebi.ac.uk/QuickGO/term/GO:0042440>)

GO - Cellular Component

- GO:0005737 : cytoplasm (<https://www.ebi.ac.uk/QuickGO/term/GO:0005737>)

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

5 changes including 4 SNP and 1bp indel in the first intron

Experimental Evidence

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

Main Reference

Genetic Convergence in the Evolution of Male-Specific Color Patterns in *Drosophila*. (2016) (<https://pubmed.ncbi.nlm.nih.gov/27546578>)

Authors

Signor SA; Liu Y; Rebeiz M; Kopp A

Abstract

Convergent evolution provides a type of natural replication that can be exploited to understand the roles of contingency and constraint in the evolution of phenotypes and the gene networks that control their development. For sex-specific traits, convergence offers the additional opportunity for testing whether the same gene networks follow different evolutionary trends in males versus females. Here, we use an unbiased, systematic mapping approach to compare the genetic basis of evolutionary changes in male-limited pigmentation in several pairs of *Drosophila* species that represent independent evolutionary transitions. We find strong evidence for repeated recruitment of the same genes to specify similar pigmentation in different species. At one of these genes, *ebony*, we observe convergent evolution of sexually dimorphic and monomorphic expression through cis-regulatory changes. However, this functional convergence has a different molecular basis in different species, reflecting both parallel fixation of ancestral alleles and independent origin of distinct mutations with similar functional consequences. Our results show that a strong evolutionary constraint at the gene level is compatible with a dominant role of chance at the molecular level.

Copyright © 2016 Elsevier Ltd. All rights reserved.

Additional References

RELATED GEPHE

Related Genes

2 (Abdominal-B, yellow) (<https://www.gephebase.org/search-criteria?/or+Taxon ID=^30036^/and+Trait=Coloration/and+groupHaplotypes=true#gephebase-summary-title>)

Related Haplotypes

No matches found.

EXTERNAL LINKS

COMMENTS

@ILS or @Introgression - @SexualTrait - A large QTL on 3R (3R1) including *ebony*; *ebony* is not expressed in segments that are completely black in darker species while it is expressed in a wider pattern in light colored taxa. Involvement of *ebony* demonstrated by RNAi experiments and evidence of cis-regulatory differences by sequencing of transcript in F1 hybrid. The causative variants in *ebony* may be due either to parallel fixation of ancestral alleles or to interspecific introgression (with the couple *D. bipectinata*-*D. parabipectinata*). For the light forms (*D. bipectinata* & *D. m. pallens*) phylogenetic analysis supports a sorting of ancestral polymorphisms.

