GEPHE SUMMARY

Gephebase Gene
pdm3 (https://www.gephebase.org/search-criteria?/and+Gene Gephebase=^pdm3^#gephebase-summary-title)

GepheID
GP00002022

Entry Status
Published

Main curator
Courtier

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
pdm3

Synonyms
BcDNA:AT16994; CG11641; CG14755; CG42698; Dmel\CG42698; Pdm3; Dmel_CG42698

String
-

Sequence Similarities
Belongs to the POU transcription factor family.

GO - Molecular Function
GO:0003700 : DNA-binding transcription factor activity (https://www.ebi.ac.uk/QuickGO/term/GO:0003700)
GO:0003677 : DNA binding (https://www.ebi.ac.uk/QuickGO/term/GO:0003677)

GO - Biological Process
GO:0007411 : axon guidance (https://www.ebi.ac.uk/QuickGO/term/GO:0007411)
GO:0007409 : axonogenesis (https://www.ebi.ac.uk/QuickGO/term/GO:0007409)

UniProtKB Drosophila melanogaster
A0A0B4LEG2 (http://www.uniprot.org/uniprot/A0A0B4LEG2)

GenebankID or UniProtKB
()

GO:0007608 : sensory perception of smell (https://www.ebi.ac.uk/QuickGO/term/GO:0007608)
GO:0007412 : axon target recognition (https://www.ebi.ac.uk/QuickGO/term/GO:0007412)

GO - Cellular Component

GO:0005634 : nucleus (https://www.ebi.ac.uk/QuickGO/term/GO:0005634)

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

change in a cis-regulatory region - exact causing mutation(s) unknown - increased pdm3 abdominal expression associated with lighter color

Experimental Evidence

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

Main Reference

Changes throughout a Genetic Network Mask the Contribution of Hox Gene Evolution. (2019) (https://pubmed.ncbi.nlm.nih.gov/31257142)

Authors

Liu Y; Ramos-Womack M; Han C; Reilly P; Brackett KL; Rogers W; Williams TM; Andolfatto P; Stern DL; Rebeiz M

Abstract

Hox genes pattern the anterior-posterior axis of animals and are posited to drive animal body plan evolution, yet their precise role in evolution has been difficult to determine. Here, we identified evolutionary modifications in the Hox gene Abd-B that dramatically altered its expression along the body plan of Drosophila santomea. Abd-B is required for pigmentation in Drosophila yakuba, the sister species of D.Â santomea, and changes to Abd-B expression would be predicted to make large contributions to the loss of body pigmentation in D.Â santomea. However, manipulating Abd-B expression in current-day D.Â santomea does not affect pigmentation. We attribute this epistatic interaction to four other genes within the D.Â santomea pigmentation network, three of which have evolved expression patterns that do not respond to Abd-B. Our results demonstrate how body plans may evolve through small evolutionary steps distributed throughout Hox-regulated networks. Polygenicity and epistasis may hinder efforts to identify genes and mechanisms underlying macroevolutionary traits.

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Additional References

RELATED GEPHE

Related Genes

5 (Abdominal-B, ebony, tan, 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

No matches found.

EXTERNAL LINKS

COMMENTS

@SexualTrait @SeveralMutationsWithEffect