GEPHE SUMMARY

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

GepheID
GP00000233

Entry Status
Published

Main curator
Martin

PHENOTYPIC CHANGE

Trait Category
Physiology (https://www.gephebase.org/search-criteria?/and+Trait Category=^Physiology^#gephebase-summary-title)

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

Trait State in Taxon A
Drosophila melanogaster

Trait State in Taxon B
Drosophila melanogaster

Ancestral State
Data not curated

Taxonomic Status
Intraspecific (https://www.gephebase.org/search-criteria?/and+Taxonomic Status=^Intraspecific^#gephebase-summary-title)

Taxon A

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

Common Name
fruit fly

Synonyms
Sophophora melanogaster; fruit fly; Drosophila melanogaster Meigen, 1830; Sophophora melanogaster (Meigen, 1830); Drosophila melangaster

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
7227 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 7227)

is Taxon A an Infraspecies?
No

Taxon B

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

Common Name
fruit fly

Synonyms
Sophophora melanogaster; fruit fly; Drosophila melanogaster Meigen, 1830; Sophophora melanogaster (Meigen, 1830); Drosophila melangaster

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
7227 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 7227)

is Taxon B an Infraspecies?
No

GENOTYPIC CHANGE

Generic Gene Name
Ddc

Synonyms
5-HT; AADC; CG10697; ddc; DDC; DdcDm; Dmel\CG10697; fDDC; l(2)37Bl; l(2)37Ch; l(2)k02104

String
7227.FBpp0080710 (http://string-db.org/newstring_cgi/show_network_section.pl?identifier= 7227.FBpp0080710)

Sequence Similarities
Belongs to the group II decarboxylase family.

GO - Molecular Function
GO:0030170 : pyridoxal phosphate binding (https://www.ebi.ac.uk/QuickGO/term/GO:0030170)
GO:0004058 : aromatic-L-amino-acid decarboxylase activity

UniProtKB Drosophila melanogaster
P05031 (http://www.uniprot.org/uniprot/P05031)

GenebankID or UniProtKB
AY197761 (https://www.ncbi.nlm.nih.gov/nuccore/AY197761)

(https://www.ebi.ac.uk/QuickGO/term/GO:0004058)

GO - Biological Process

GO:0007616 : long-term memory (https://www.ebi.ac.uk/QuickGO/term/GO:0007616)
GO:0048085 : adult chitin-containing cuticle pigmentation
(https://www.ebi.ac.uk/QuickGO/term/GO:0048085)
GO:0007615 : anesthesia-resistant memory
(https://www.ebi.ac.uk/QuickGO/term/GO:0007615)
GO:0006585 : dopamine biosynthetic process from tyrosine
(https://www.ebi.ac.uk/QuickGO/term/GO:0006585)
GO:0048082 : regulation of adult chitin-containing cuticle pigmentation
(https://www.ebi.ac.uk/QuickGO/term/GO:0048082)
GO:0009611 : response to wounding (https://www.ebi.ac.uk/QuickGO/term/GO:0009611)
GO:0006587 : serotonin biosynthetic process from tryptophan
(https://www.ebi.ac.uk/QuickGO/term/GO:0006587)
GO:0040040 : thermosensory behavior
(https://www.ebi.ac.uk/QuickGO/term/GO:0040040)
GO:0043052 : thermotaxis (https://www.ebi.ac.uk/QuickGO/term/GO:0043052)
GO:0035220 : wing disc development
(https://www.ebi.ac.uk/QuickGO/term/GO:0035220)

GO - Cellular Component

-

Presumptive Null

Unknown (https://www.gephebase.org/search-criteria?/and+Presumptive Null=^Unknown^#gephebase-summary-title)

Molecular Type

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

Aberration Type

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

Molecular Details of the Mutation

unknown

Experimental Evidence

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

Main Reference

Dopa decarboxylase (Ddc) affects variation in Drosophila longevity. (2003) (https://pubmed.ncbi.nlm.nih.gov/12881721)

Authors

De Luca M; Roshina NV; Geiger-Thornsberry GL; Lyman RF; Pasyukova EG; Mackay TF

Abstract

Mutational analyses in model organisms have shown that genes affecting metabolism and stress resistance regulate life span, but the genes responsible for variation in longevity in natural populations are largely unidentified. Previously, we mapped quantitative trait loci (QTLs) affecting variation in longevity between two Drosophila melanogaster strains. Here, we show that the longevity QTL in the 36E;38B cytogenetic interval on chromosome 2 contains multiple closely linked QTLs, including the Dopa decarboxylase (Ddc) locus. Complementation tests to mutations show that Ddc is a positional candidate gene for life span in these strains. Linkage disequilibrium (LD) mapping in a sample of 173 alleles from a single population shows that three common molecular polymorphisms in Ddc account for 15.5% of the genetic contribution to variance in life span from chromosome 2. The polymorphisms are in strong LD, and the effects of the haplotypes on longevity suggest that the polymorphisms are maintained by balancing selection. DDC catalyzes the final step in the synthesis of the neurotransmitters, dopamine and serotonin. Thus, these data implicate variation in the synthesis of bioamines as a factor contributing to natural variation in individual life span.

Additional References

RELATED GEPHE

Related Genes

3 (Catecholamines up, Darkener of apricot (Doa), InR) (https://www.gephebase.org/search-criteria?/or+Taxon ID=^7227^/and+Trait=Lifespan/and+groupHaplotypes=true#gephebase-summary-title)

Related Haplotypes

1 (https://www.gephebase.org/search-criteria?/or+Gene Gephebase=^Dopa-decarboxylase^/and+Taxon ID=^7227^/or+Gene Gephebase=^Dopa-decarboxylase^/and+Taxon ID=^7227^#gephebase-summary-title)

EXTERNAL LINKS

COMMENTS

@BalancingSelection - http://flybase.org/reports/FBal0184173 to http://flybase.org/reports/FBal0184186