GEPHE SUMMARY

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

GepheID
GP00002664

Entry Status
Published

Main curator
Courtier

PHENOTYPIC CHANGE

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

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

Trait State in Taxon A
-

Trait State in Taxon B
-

Ancestral State
Unknown

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
Eip75B

Synonyms
57B; 75B; anon-WO0172774.31; anon-WO0172774.32; BcDNA:GM02640; CG8127; dE75; DmE75; DmE75A; DmE75B; Dmel\CG8127; E75; E75-C; E75A; E75B; E75C; Eip75; EiP75; Eip75 A; eip75a; Eip75A; eip75B; EP1121b; l(3)07041; l(3)j11A6; l(3)j12E8; l(3)j3A6; l(3)j5E1; l(3)neo25; Mgn00274; NR1D3; Rev-Erb; REV-ERB&agr

String
-

Sequence Similarities
Belongs to the nuclear hormone receptor family. NR1 subfamily.

GO - Molecular Function
GO:0008270 : zinc ion binding (https://www.ebi.ac.uk/QuickGO/term/GO:0008270)
GO:0003677 : DNA binding (https://www.ebi.ac.uk/QuickGO/term/GO:0003677)
GO:0004879 : nuclear receptor activity

UniProtKB Drosophila melanogaster
P17672 (http://www.uniprot.org/uniprot/P17672)

GenebankID or UniProtKB
()

(https://www.ebi.ac.uk/QuickGO/term/GO:0004879)
GO:0000978 : RNA polymerase II proximal promoter sequence-specific DNA binding
(https://www.ebi.ac.uk/QuickGO/term/GO:0000978)
GO:0020037 : heme binding (https://www.ebi.ac.uk/QuickGO/term/GO:0020037)

GO - Biological Process

GO:0045944 : positive regulation of transcription by RNA polymerase II
(https://www.ebi.ac.uk/QuickGO/term/GO:0045944)
GO:0030154 : cell differentiation (https://www.ebi.ac.uk/QuickGO/term/GO:0030154)
GO:0009755 : hormone-mediated signaling pathway
(https://www.ebi.ac.uk/QuickGO/term/GO:0009755)
GO:0000122 : negative regulation of transcription by RNA polymerase II
(https://www.ebi.ac.uk/QuickGO/term/GO:0000122)
GO:0010468 : regulation of gene expression
(https://www.ebi.ac.uk/QuickGO/term/GO:0010468)
GO:0048477 : oogenesis (https://www.ebi.ac.uk/QuickGO/term/GO:0048477)
GO:0018990 : ecdysis, chitin-based cuticle
(https://www.ebi.ac.uk/QuickGO/term/GO:0018990)
GO:0007591 : molting cycle, chitin-based cuticle
(https://www.ebi.ac.uk/QuickGO/term/GO:0007591)
GO:0007553 : regulation of ecdysteroid metabolic process
(https://www.ebi.ac.uk/QuickGO/term/GO:0007553)
GO:0035075 : response to ecdysone (https://www.ebi.ac.uk/QuickGO/term/GO:0035075)

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

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

Molecular Details of the Mutation

This SNP is biallelic with the â€œTâ€ variant being more common in the late-reproducing long-lived populations (average frequency: 0.84 â€œTâ€ / 0.16 â€œGâ€) as compared to the early-reproducing populations (average frequency: 0.52 â€œTâ€ / 0.48 â€œGâ€).

Experimental Evidence

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

Main Reference

A Single Nucleotide Variant in the PPARÎ³-homolog Eip75B Affects Fecundity in Drosophila. (2023) (https://pubmed.ncbi.nlm.nih.gov/36703226)

Authors

Hoedjes KM; Kostic H; Flatt T; Keller L

Abstract

Single nucleotide polymorphisms are the most common type of genetic variation, but how these variants contribute to the adaptation of complex phenotypes is largely unknown. Experimental evolution and genome-wide association studies have demonstrated that variation in the PPARÎ³-homolog Eip75B has associated with longevity and life-history differences in the fruit fly Drosophila melanogaster. Using RNAi knockdown, we first demonstrate that reduced expression of Eip75B in adult flies affects lifespan, egg-laying rate, and egg volume. We then tested the effects of a naturally occurring SNP within a cis-regulatory domain of Eip75B by applying two complementary approaches: a Mendelian randomization approach using lines of the Drosophila Genetic Reference Panel, and allelic replacement using precise CRISPR/Cas9-induced genome editing. Our experiments reveal that this natural polymorphism has a significant pleiotropic effect on fecundity and egg-to-adult viability, but not on longevity or other life-history traits. Our results provide a rare functional validation at the nucleotide level and identify a natural allelic variant affecting fitness and life-history adaptation.

Additional References

RELATED GEPHE

Related Genes

6 (bab2, Drip, Sdic gene cluster, InR, PHGPx, RnrS) (https://www.gephebase.org/search-criteria?/or+Taxon ID=^7227^/and+Trait=Fertility/and+groupHaplotypes=true#gephebase-summary-title)

Related Haplotypes

No matches found.

EXTERNAL LINKS

COMMENTS

Validated by @CRISPR. Eip75B has been identified previously as an â€œagingâ€ candidate gene by two previous genome-wide association studies.