

GEPHE SUMMARY

Gephebase Gene
foraging

Entry Status
Published

GepheID
GP00000350

Main curator
Martin

PHENOTYPIC CHANGE

Trait Category
Behavior

Trait
Food-search behavior

Trait State in Taxon A
Drosophila melanogaster - sitter allele - slow locomotion

Trait State in Taxon B
Drosophila melanogaster - rover allele - increased larval locomotion - larvae more active - Adults carrying the R allele walk farther from food source after feeding than do adults with the S strain.

Ancestral State
Unknown

Taxonomic Status
Intraspecific

Taxon A

Latin Name
Drosophila melanogaster

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; Cyclorhapha; Schizophora; Acalytratae; Ephydroidea; Drosophilidae; Drosophilinae; Drosophilini; Drosophila; Sophophora; melanogaster group; melanogaster subgroup

Parent
melanogaster subgroup () - (Rank: species subgroup)

NCBI Taxonomy ID
7227

is Taxon A an Intraspecies?
No

Taxon B

Latin Name
Drosophila melanogaster

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; Cyclorhapha; Schizophora; Acalytratae; Ephydroidea; Drosophilidae; Drosophilinae; Drosophilini; Drosophila; Sophophora; melanogaster group; melanogaster subgroup

Parent
melanogaster subgroup () - (Rank: species subgroup)

NCBI Taxonomy ID
7227

is Taxon B an Intraspecies?
No

GENOTYPIC CHANGE

Generic Gene Name
for

Synonyms
142251_lat; anon-WO0140519.260; anon-WO02059370.47; BcDNA:GM08338; CG10033; dg2; Dg2; DG2; Dmel\CG10033; For; FOR/PKG; I(2)06860; PKG; Pkg2; PKG2; Pkg24A; PKK2

String
7227.FBpp0088350

Sequence Similarities
Belongs to the protein kinase superfamily. AGC Ser/Thr protein kinase family. cGMP subfamily.

GO - Molecular Function
GO:0005524 : ATP binding
GO:0004674 : protein serine/threonine kinase activity
GO:0030553 : cGMP binding
GO:0004692 : cGMP-dependent protein kinase activity

UniProtKB Drosophila melanogaster
Q03043

GenebankID or UniProtKB
M27120

GO - Biological Process

GO:0007616 : long-term memory
GO:0006468 : protein phosphorylation
GO:0007614 : short-term memory
GO:0008016 : regulation of heart contraction
GO:0030536 : larval feeding behavior
GO:0007631 : feeding behavior
GO:0046959 : habituation
GO:0008345 : larval locomotory behavior
GO:0008045 : motor neuron axon guidance
GO:0030510 : regulation of BMP signaling pathway
GO:0032095 : regulation of response to food
GO:0009744 : response to sucrose

GO - Cellular Component

GO:0005886 : plasma membrane
GO:0005737 : cytoplasm
GO:0005829 : cytosol

Presumptive Null

No

Molecular Type

Cis-regulatory

Aberration Type

SNP

Molecular Details of the Mutation

The *for*s (*sitter*) and *for*R (*rover*) alleles differ in a SNP that lies within a predicted Mad protein-binding site in a region upstream of the *pr4* transcription start site. The SNP is a C in *for*s and an A in *for*R (the latter is predicted to reduce Mad protein binding).

Experimental Evidence

[Linkage Mapping](#)

Main Reference

[Natural behavior polymorphism due to a cGMP-dependent protein kinase of *Drosophila*. \(1997\)](#)

Authors

Osborne KA; Robichon A; Burgess E; Butland S; Shaw RA; Coulthard A; Pereira HS; Greenspan RJ; Sokolowski MB

Abstract

Naturally occurring polymorphisms in behavior are difficult to map genetically and thus are refractory to molecular characterization. An exception is the foraging gene (*for*), a gene that has two naturally occurring variants in *Drosophila melanogaster* food-search behavior: *rover* and *sitter*. Molecular mapping placed for mutations in the *dg2* gene, which encodes a cyclic guanosine monophosphate (cGMP)-dependent protein kinase (PKG). *Rovers* had higher PKG activity than *sitters*, and transgenic *sitters* expressing a *dg2* complementary DNA from *rover* showed transformation of behavior to *rover*. Thus, PKG levels affected food-search behavior, and natural variation in PKG activity accounted for a behavioral polymorphism.

Additional References

[Natural polymorphism affecting learning and memory in *Drosophila*. \(2007\)](#)

[Epigenetic mechanisms modulate differences in *Drosophila* foraging behavior. \(2017\)](#)

RELATED GEPHE

Related Genes

No matches found.

Related Haplotypes

No matches found.

EXTERNAL LINKS

COMMENTS

<http://flybase.org/reports/FBal0004143> - <http://flybase.org/reports/FBal0004144>

