GEPHE SUMMARY

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

GepheID
GP00000350

Entry Status
Published

Main curator
Martin

PHENOTYPIC CHANGE

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

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

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 (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
for

Synonyms
142251_at; anon-WO0140519.260; anon-WO02059370.47; BcDNA:GM08338; CG10033; dg2; Dg2; DG2; Dmel\CG10033; For; FOR/PKG; l(2)06860; PKG; Pkg2; PKG2; Pkg24A; PGK2

String
7227.FBpp0088350 (http://string-db.org/newstring_cgi/show_network_section.pl?identifier= 7227.FBpp0088350)

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

UniProtKB Drosophila melanogaster
Q03043 (http://www.uniprot.org/uniprot/Q03043)

GenebankID or UniProtKB
M27120 (https://www.ncbi.nlm.nih.gov/nuccore/M27120)

GO - Molecular Function

GO:0005524 : ATP binding (https://www.ebi.ac.uk/QuickGO/term/GO:0005524)
GO:0004674 : protein serine/threonine kinase activity (https://www.ebi.ac.uk/QuickGO/term/GO:0004674)
GO:0030553 : cGMP binding (https://www.ebi.ac.uk/QuickGO/term/GO:0030553)
GO:0004692 : cGMP-dependent protein kinase activity (https://www.ebi.ac.uk/QuickGO/term/GO:0004692)

GO - Biological Process

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

GO - Cellular Component

GO:0005886 : plasma membrane (https://www.ebi.ac.uk/QuickGO/term/GO:0005886)
GO:0005737 : cytoplasm (https://www.ebi.ac.uk/QuickGO/term/GO:0005737)
GO:0005829 : cytosol (https://www.ebi.ac.uk/QuickGO/term/GO:0005829)

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

The fors (sitter) and forR (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 fors and an A in forR (the latter is predicted to reduce Mad protein binding).

Experimental Evidence

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

Main Reference

Natural behavior polymorphism due to a cGMP-dependent protein kinase of Drosophila. (1997) (https://pubmed.ncbi.nlm.nih.gov/9242616)

Authors

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

Abstract

Naturally occuring 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) (https://pubmed.ncbi.nlm.nih.gov/17640898)
Epigenetic mechanisms modulate differences in Drosophila foraging behavior. (2017) (https://pubmed.ncbi.nlm.nih.gov/29078350)

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