GEPHE SUMMARY

Gephebase Gene

Gr5a (https://www.gephebase.org/search-criteria?/and+Gene Gephebase=^Gr5a^#gephebase-summary-title)

GepheID

GP00001997

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

Taste sensitivity (sugar; trehalose) (https://www.gephebase.org/search-criteria?/and+Trait=^Taste sensitivity (sugar; trehalose)^#gephebase-summary-title)

Trait State in Taxon A

Drosophila melanogaster - semidominant allele that confers low taste sensitivity to trehalose but does not affect taste sensitivity to glucose; fructose or sucrose.

Trait State in Taxon B

Drosophila melanogaster - sensitive - derived allele

Ancestral State

Taxon A

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

Gr5a

Synonyms

CG15779; Dmel5a; Dmel\CG15779; Gr5; GR5a; GR5A; Gr5A1; GRLU.7; GrLU7; han; LU.7; tre; Tre

String

7227.FBpp0070768 (http://string-db.org/newstring_cgi/show_network_section.pl?identifier= 7227.FBpp0070768)

Sequence Similarities

Belongs to the insect chemoreceptor superfamily. Gustatory receptor (GR) family. Gr5a subfamily.

GO - Molecular Function

GO:0008527 : taste receptor activity (https://www.ebi.ac.uk/QuickGO/term/GO:0008527)

UniProtKB Drosophila melanogaster

Q9W497 (http://www.uniprot.org/uniprot/Q9W497)

GenebankID or UniProtKB

()

GO:0033041 : sweet taste receptor activity
(https://www.ebi.ac.uk/QuickGO/term/GO:0033041)

GO - Biological Process

GO:0007165 : signal transduction (https://www.ebi.ac.uk/QuickGO/term/GO:0007165)
GO:0001582 : detection of chemical stimulus involved in sensory perception of sweet taste
(https://www.ebi.ac.uk/QuickGO/term/GO:0001582)
GO:0050916 : sensory perception of sweet taste
(https://www.ebi.ac.uk/QuickGO/term/GO:0050916)
GO:0050912 : detection of chemical stimulus involved in sensory perception of taste
(https://www.ebi.ac.uk/QuickGO/term/GO:0050912)
GO:0007637 : proboscis extension reflex
(https://www.ebi.ac.uk/QuickGO/term/GO:0007637)
GO:0010353 : response to trehalose (https://www.ebi.ac.uk/QuickGO/term/GO:0010353)
GO:0050909 : sensory perception of taste
(https://www.ebi.ac.uk/QuickGO/term/GO:0050909)

GO - Cellular Component

GO:0016021 : integral component of membrane
(https://www.ebi.ac.uk/QuickGO/term/GO:0016021)
GO:0005886 : plasma membrane (https://www.ebi.ac.uk/QuickGO/term/GO:0005886)

Presumptive Null

No (https://www.gephebase.org/search-criteria?/and+Presumptive Null=^No^#gephebase-summary-title)

Molecular Type

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

Aberration Type

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

SNP Coding Change

Nonsynonymous

Molecular Details of the Mutation

Nucleotide change: A5681571G - Amino acid change: T218A

Experimental Evidence

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

	Taxon A	Taxon B	Position
Codon	ACN	GCN	5681571
Amino-acid	Thr	Ala	218

Main Reference

Trehalose sensitivity in Drosophila correlates with mutations in and expression of the gustatory receptor gene Gr5a. (2001) (https://pubmed.ncbi.nlm.nih.gov/11566105)

Authors

Ueno K; Ohta M; Morita H; Mikuni Y; Nakajima S; Yamamoto K; Isono K

Abstract

Drosophila taste gene Tre is located on the distal X chromosome and controls gustatory sensitivity to a subset of sugars [1, 2]. Two adjacent, seven-transmembrane domain genes near the Tre locus are candidate genes for Tre. One (CG3171) encodes a rhodopsin family G protein receptor [3, 4], and the other (Gr5a) is a member of a chemosensory gene family encoding a putative gustatory receptor [5-7]. We carried out molecular analyses of mutations in Tre to elucidate their involvement in the gustatory phenotype. Here, we show that Tre mutations induced by P element-mediated genomic deletions disrupt Gr5a gene organization and the expression of Gr5a mRNA, while disruption of the CG3171 gene or its expression was not always associated with mutations in Tre. In flies with the spontaneous mutation Tre(01), both CG3171 and Gr5a mRNAs are transcribed. Coding sequences of these two candidate genes were compared among various strains. A total of three polymorphic sites leading to amino acid changes in CG3171 were not correlated with the gustatory phenotype. Among four nonsynonymous sites in Gr5a, a single nucleotide polymorphism leading to an Ala218Thr substitution in the predicted second intracellular loop cosegregated with Tre(01). Taken together, the mutation analyses support that Gr5a is allelic to Tre.

Additional References

Genetic dimorphism in the taste sensitivity to trehalose inDrosophila melanogaster . (1982) (https://pubmed.ncbi.nlm.nih.gov/00000000.000018)
A single-amino-acid change of the gustatory receptor gene, Gr5a, has a major effect on trehalose sensitivity in a natural population of Drosophila melanogaster. (2004)
(https://pubmed.ncbi.nlm.nih.gov/15342513)

RELATED GEPHE

Related Genes

No matches found.

Related Haplotypes

No matches found.

EXTERNAL LINKS

COMMENTS