

GEPHE SUMMARY

	Gephebase Gene	GephelD
glycerol-3-phosphate dehydrogenase (Gpdh) (https://www.gephebase.org/search-criteria?/and+Gene Gephebase=^glycerol-3-phosphate dehydrogenase (Gpdh)^#gephebase-summary-title)	GP00001998	Main curator
	Courtier	
	Entry Status	
Published		

PHENOTYPIC CHANGE

	Trait Category		
Physiology (https://www.gephebase.org/search-criteria?/and+Trait Category=^Physiology^#gephebase-summary-title)	Trait		
Enzymatic activity (https://www.gephebase.org/search-criteria?/and+Trait=^Enzymatic activity^#gephebase-summary-title)	Trait State in Taxon A		
Drosophila melanogaster - wild-type activity	Trait State in Taxon B		
Drosophila melanogaster - reduced activity	Ancestral State		
Taxon A	Taxonomic Status		
Intraspecific (https://www.gephebase.org/search-criteria?/and+Taxonomic Status=^Intraspecific^#gephebase-summary-title)			
	Taxon A	Taxon B	
	Latin Name	Latin Name	
Drosophila melanogaster (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=^Drosophila melanogaster^#gephebase-summary-title)	Drosophila melanogaster (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=^Drosophila melanogaster^#gephebase-summary-title)	Drosophila melanogaster (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=^Drosophila melanogaster^#gephebase-summary-title)	Common Name
fruit fly	Synonyms	fruit fly	Synonyms
Sophophora melanogaster; fruit fly; Drosophila melanogaster Meigen, 1830; Sophophora melanogaster (Meigen, 1830); Drosophila melangaster	Sophophora melanogaster; fruit fly; Drosophila melanogaster Meigen, 1830; Sophophora melanogaster (Meigen, 1830); Drosophila melangaster	Sophophora melanogaster; fruit fly; Drosophila melanogaster Meigen, 1830; Sophophora melanogaster (Meigen, 1830); Drosophila melangaster	Rank
species	Rank	species	Rank
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; Ephydrioidea; Drosophilidae; Drosophilinae; Drosophilini; Drosophila; Sophophora; melanogaster group; melanogaster subgroup	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; Ephydrioidea; Drosophilidae; Drosophilinae; Drosophilini; Drosophila; Sophophora; melanogaster group; melanogaster subgroup	Lineage
melanogaster subgroup () - (Rank: species subgroup) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 32351)	Parent	melanogaster subgroup () - (Rank: species subgroup) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 32351)	Parent
7227 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 7227)	NCBI Taxonomy ID	7227 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 7227)	NCBI Taxonomy ID
No	is Taxon A an Infraspecies?	No	is Taxon B an Infraspecies?

GENOTYPIC CHANGE

	Generic Gene Name		
Gpdh	Synonyms	UniProtKB Drosophila melanogaster	
GPD; alpha-GPD; alpha-Gpdh; alpha-GPDH; alpha-GPDH-1; alphaGpd; alphaGpdh; alphaGPDH; alphaGpdh-1; CG9042; dGpdh; Dmel\CG9042; DmG3PDH; DROGPDHA; G3pdh; G3PDH; GAPDH; Gdh; Gpd; GPDA; gpdh; Gpdh; GPDH; gpdh-1; GPDH-1; sn-Gpdh	P13706 (http://www.uniprot.org/uniprot/P13706)	GenebankID or UniProtKB	
7227.FBpp0305431 (http://string-db.org/newstring_cgi/show_network_section.pl?identifier= 7227.FBpp0305431)	String	0	
Belongs to the NAD-dependent glycerol-3-phosphate dehydrogenase family.	Sequence Similarities		
	GO - Molecular Function		

GO:0042803 : protein homodimerization activity
(<https://www.ebi.ac.uk/QuickGO/term/GO:0042803>)
GO:0051287 : NAD binding (<https://www.ebi.ac.uk/QuickGO/term/GO:0051287>)
GO:0004367 : glycerol-3-phosphate dehydrogenase [NAD+] activity
(<https://www.ebi.ac.uk/QuickGO/term/GO:0004367>)

GO - Biological Process

GO:0005975 : carbohydrate metabolic process
(<https://www.ebi.ac.uk/QuickGO/term/GO:0005975>)
GO:0006067 : ethanol metabolic process
(<https://www.ebi.ac.uk/QuickGO/term/GO:0006067>)
GO:0055114 : oxidation-reduction process
(<https://www.ebi.ac.uk/QuickGO/term/GO:0055114>)
GO:0006641 : triglyceride metabolic process
(<https://www.ebi.ac.uk/QuickGO/term/GO:0006641>)
GO:0055093 : response to hyperoxia (<https://www.ebi.ac.uk/QuickGO/term/GO:0055093>)
GO:0007629 : flight behavior (<https://www.ebi.ac.uk/QuickGO/term/GO:0007629>)
GO:0046168 : glycerol-3-phosphate catabolic process
(<https://www.ebi.ac.uk/QuickGO/term/GO:0046168>)
GO:0006072 : glycerol-3-phosphate metabolic process
(<https://www.ebi.ac.uk/QuickGO/term/GO:0006072>)
GO:0006650 : glycerophospholipid metabolic process
(<https://www.ebi.ac.uk/QuickGO/term/GO:0006650>)
GO:0006116 : NADH oxidation (<https://www.ebi.ac.uk/QuickGO/term/GO:0006116>)

GO - Cellular Component

GO:0005829 : cytosol (<https://www.ebi.ac.uk/QuickGO/term/GO:0005829>)
GO:0030018 : Z disc (<https://www.ebi.ac.uk/QuickGO/term/GO:0030018>)
GO:0009331 : glycerol-3-phosphate dehydrogenase complex
(<https://www.ebi.ac.uk/QuickGO/term/GO:0009331>)
GO:0031430 : M band (<https://www.ebi.ac.uk/QuickGO/term/GO:0031430>)

Presumptive Null

No (<https://www.gepheebase.org/search-criteria/?and+Presumptive+Null=%22No%22#gepheebase-summary-title>)

Molecular Type

Cis-regulatory (<https://www.gepheebase.org/search-criteria/?and+Molecular+Type=%22Cis-regulatory%22#gepheebase-summary-title>)

Aberration Type

Insertion (<https://www.gepheebase.org/search-criteria/?and+Aberration+Type=%22Insertion%22#gepheebase-summary-title>)

Insertion Size

1-10 kb

Molecular Details of the Mutation

insertion of a 8kb blood retrotransposon in the 3' region of the Gpdh gene 66bp downstream of the stop codon. This mutation induces a GPDH isozyme-GPDH-4-and alters the pattern of expression of the three normal isozymes-GPDH-1 to GPDH-3.

Experimental Evidence

Candidate Gene (<https://www.gepheebase.org/search-criteria/?and+Experimental+Evidence=%22Candidate+Gene%22#gepheebase-summary-title>)

Main Reference

Retrotransposon insertion induces an isozyme of sn-glycerol-3-phosphate dehydrogenase in Drosophila melanogaster. (1995) (<https://pubmed.ncbi.nlm.nih.gov/8618845/>)

Authors

Wilanowski TM; Gibson JB; Symonds JE

Abstract

The insertion of the blood retrotransposon into the untranslated region of exon 7 of the sn-glycerol-3-phosphate dehydrogenase-encoding gene (Gpdh) in Drosophila melanogaster induces a GPDH isozyme-GPDH-4-and alters the pattern of expression of the three normal isozymes-GPDH-1 to GPDH-3. The process of transcript terminus formation inside the retrotransposon insertion reduces the level of the Gpdh transcript that contains exon 8 and increases the level of the transcript that contains exons 1-7. The induced GPDH-4 isozyme is a translation product of the three transcripts that contain fragments of the blood retrotransposon. The mechanism of mutagenesis by the blood insertion is postulated to involve the pause or termination of transcription within the blood sequence, which in turn is caused by the interference of a DNA-binding protein with the RNA polymerase. Thus, we show the formation of a new functional GPDH protein by the insertion of a transposable element and discuss the evolutionary significance of this phenomenon.

Additional References

RELATED GEPHE

3 (Dopa oxidase-3 (Dox-3), prophenoloxidase 1 (PPO1), tryptophan phenylalanine hydroxylase) (<https://www.gepheebase.org/search-criteria/?or+Taxon+ID=%227227%22+and+Trait=Enzymatic+activity+and+groupHaplotypes=true#gepheebase-summary-title>)

Related Genes

1 ([https://www.gepheebase.org/search-criteria/?or+Gene+Gepheebase=%22glycerol-3-phosphate+dehydrogenase+\(Gpdh\)%22+and+Taxon+ID=%227227%22+or+Gene+Gepheebase=%22glycerol-3-phosphate+dehydrogenase+\(Gpdh\)%22+and+Taxon+ID=%227227%22#gepheebase-summary-title](https://www.gepheebase.org/search-criteria/?or+Gene+Gepheebase=%22glycerol-3-phosphate+dehydrogenase+(Gpdh)%22+and+Taxon+ID=%227227%22+or+Gene+Gepheebase=%22glycerol-3-phosphate+dehydrogenase+(Gpdh)%22+and+Taxon+ID=%227227%22#gepheebase-summary-title))

Related Haplotypes

EXTERNAL LINKS

COMMENTS

