

GEPHE SUMMARY

Gephebase Gene

[hsp70Ba](#)

Entry Status

Published

GepheID

GP00002004

Main curator

Courtier

PHENOTYPIC CHANGE

Trait Category

[Physiology](#)

Trait

[Temperature tolerance](#)

Trait State in Taxon A

Drosophila melanogaster - wild-type tolerance

Trait State in Taxon B

Drosophila melanogaster - lower tolerance

Ancestral State

Taxon A

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; Cyclorrhapha; Schizophora; Acalyptera; 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; Cyclorrhapha; Schizophora; Acalyptera; 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?

Yes

Taxon B Description

T32 population - collected in Chad; Africa in 1977

GENOTYPIC CHANGE

Generic Gene Name

Hsp70Ba

Synonyms

CG31449; dhsp70; dHsp70; Dm-hsp70; Dmel\CG31449; Hsp 70; hsp-70; Hsp-70; hsp70; Hsp70; HSP70; hsp70 87C; hsp70 Ba; Hsp70(87C); hsp70b; hsp70B; Hsp70B; hsp70ba; hsp70Ba

String

7227.FBpp0082107

Sequence Similarities

Belongs to the heat shock protein 70 family.

GO - Molecular Function

GO:0005524 : ATP binding

GO:0031072 : heat shock protein binding

GO:0051082 : unfolded protein binding

UniProtKB *Drosophila melanogaster*

[Q81N18](#)

GenebankID or UniProtKB

GO:0016887 : ATPase activity
GO:0042623 : ATPase activity, coupled
GO:0051787 : misfolded protein binding
GO:0044183 : protein folding chaperone

GO - Biological Process

GO:0001666 : response to hypoxia
GO:0034605 : cellular response to heat
GO:0009408 : response to heat
GO:0034620 : cellular response to unfolded protein
GO:0051085 : chaperone cofactor-dependent protein refolding
GO:0035080 : heat shock-mediated polytene chromosome puffing
GO:0042026 : protein refolding
GO:0006986 : response to unfolded protein

GO - Cellular Component

GO:0005737 : cytoplasm
GO:0005829 : cytosol

Presumptive Null

No

Molecular Type

Cis-regulatory

Aberration Type

Insertion

Insertion Size

1-10 kb

Molecular Details of the Mutation

A 1447 bp fragment corresponding to the 39 end of a jockey element is inserted 107 bps upstream of the hsp70Ba transcription start site in the T strain. The insertion intervenes between HSEs 2 and 3; displacing HSEs 3 and 4 as well as three GAGA elements.

Experimental Evidence

Candidate Gene

Main Reference

Modification of heat-shock gene expression in *Drosophila melanogaster* populations via transposable elements. (2003)

Authors

Lerman DN; Michalak P; Helin AB; Bettencourt BR; Feder ME

Abstract

We report multiple cases in which disruption of hsp70 regulatory regions by transposable element (TE) insertions underlies natural variation in expression of the stress-inducible molecular chaperone Hsp70 in *Drosophila melanogaster*. Three *D. melanogaster* populations from different continents are polymorphic for jockey or P element insertions in the promoter of the hsp70Ba gene. All three TE insertions are within the same 87-bp region of hsp70Ba promoter, and we suggest that the distinctive promoter architecture of hsp genes may make them vulnerable to TE insertions. Each of the TE insertions reduces Hsp70 levels, and RNase protection assays demonstrate that such insertions can reduce transcription of the hsp70Ba gene. In addition, the TEs alter two measures of organismal fitness, inducible thermotolerance and female reproductive success. Thus, transposition can create quantitative genetic variation in gene expression within populations, on which natural selection can act.

Additional References

RELATED GEPHE

Related Genes

1 (lncRNA:Hsr omega)

Related Haplotypes

2

COMMENTS

@TE - <http://flybase.org/reports/FBa0147840.html>