

GEPHE SUMMARY

Gephebase Gene	GepheID
GSS (glutathione synthetase) (https://www.gephebase.org/search-criteria/?and+Gene+Gephebase=%GSS+(glutathione+synthetase)%#gephebase-summary-title)	GP00002115
Entry Status	Courtier
Published	Main curator

PHENOTYPIC CHANGE

Trait Category	
Trait	
Xenobiotic resistance (arsenic) (https://www.gephbase.org/search-criteria/?and+Trait=^Xenobiotic+resistance+(arsenic)+#gephbase-summary-title)	Trait State in Taxon A
Drosophila melanogaster susceptible to arsenic	Trait State in Taxon B
Drosophila melanogaster resistant to arsenic	Ancestral State
Taxon A	Taxonomic Status
Intraspecific (https://www.gephbase.org/search-criteria/?and+Taxonomic+Status=^Intraspecific+#gephbase-summary-title)	
Taxon A	
Latin Name	
Drosophila melanogaster (https://www.gephbase.org/search-criteria/?and+Taxon+and+Synonyms=^Drosophila+melanogaster+#gephbase-summary-title)	
fruit fly	Common Name
Sophophora melanogaster; fruit fly; Drosophila melanogaster Meigen, 1830; Sophophora melanogaster (Meigen, 1830); Drosophila melangaster	Synonyms
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; Ephydroidea; 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
7227 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 7227)	NCBI Taxonomy ID
Yes	is Taxon A an Infraspecies?
Taxon A Description	
Strain Oregon R; A2; A6 and B3	
Taxon B	
Latin Name	
Drosophila melanogaster (https://www.gephbase.org/search-criteria/?and+Taxon+and+Synonyms=^Drosophila+melanogaster+#gephbase-summary-title)	
fruit fly	Common Name
Sophophora melanogaster; fruit fly; Drosophila melanogaster Meigen, 1830; Sophophora melanogaster (Meigen, 1830); Drosophila melangaster	Synonyms
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; Ephydroidea; 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
7227 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 7227)	NCBI Taxonomy ID
Yes	is Taxon B an Infraspecies?
Taxon B Description	
Strains ISO-1; A1; B2	

GENOTYPIC CHANGE

Generic Gene Name	UniProtKB Drosophila melanogaster
Gss2	Q86B44 (http://www.uniprot.org/uniprot/Q86B44)
Synonyms	GenebankID or UniProtKB
32495; CG32495; Dmel\CG32495; GS; gss; 6835; CG32497; CG33065; Dmel\CG6835; GSS; Gss1; CG6835; Dmel_CG32495; Dmel_CG6835	0
String	
7227.FBpp0290197 (http://string-db.org/newstring_cgi/show_network_section.pl?identifier=7227.FBpp0290197)	
Sequence Similarities	
Belongs to the eukaryotic GSH synthase family.	
GO - Molecular Function	

GO:0042803 : protein homodimerization activity
(<https://www.ebi.ac.uk/QuickGO/term/GO:0042803>)

GO:0000287 : magnesium ion binding
(<https://www.ebi.ac.uk/QuickGO/term/GO:0000287>)

GO:0043295 : glutathione binding (<https://www.ebi.ac.uk/QuickGO/term/GO:0043295>)

GO:0004363 : glutathione synthase activity
(<https://www.ebi.ac.uk/QuickGO/term/GO:0004363>)

GO - Biological Process

GO:0071722 : detoxification of arsenic-containing substance

(<https://www.ebi.ac.uk/QuickGO/term/GO:0071722>)

GO - Cellular Component

GO:0005829 : cytosol (<https://www.ebi.ac.uk/QuickGO/term/GO:0005829>)

Presumptive Null

Unknown ([#gephebase-summary-title](https://www.gephebase.org/search-criteria?/and+Presumptive+Null=^Unknown))

Molecular Type

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

Aberration Type

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

Insertion Size

1-10 kb

Molecular Details of the Mutation

tandem duplication creating the Gss1/Gss2 gene pair. Associated with increased expression of Gss1.

Experimental Evidence

Candidate Gene ([#gephebase-summary-title](https://www.gephebase.org/search-criteria?/and+Experimental+Evidence=^Candidate+Gene))

Main Reference

Structural variants exhibit widespread allelic heterogeneity and shape variation in complex traits. (2019) (<https://pubmed.ncbi.nlm.nih.gov/31653862>)

Authors

Chakraborty M; Emerson JJ; Macdonald SJ; Long AD

Abstract

It has been hypothesized that individually-rare hidden structural variants (SVs) could account for a significant fraction of variation in complex traits. Here we identified more than 20,000 euchromatic SVs from 14 *Drosophila melanogaster* genome assemblies, of which ~40% are invisible to high specificity short-read genotyping approaches. SVs are common, with 31.5% of diploid individuals harboring a SV in genes larger than 5kb, and 24% harboring multiple SVs in genes larger than 10kb. SV minor allele frequencies are rarer than amino acid polymorphisms, suggesting that SVs are more deleterious. We show that a number of functionally important genes harbor previously hidden structural variants likely to affect complex phenotypes.

Furthermore, SVs are overrepresented in candidate genes associated with quantitative trait loci mapped using the *Drosophila Synthetic Population Resource*. We conclude that SVs are ubiquitous, frequently constitute a heterogeneous allelic series, and can act as rare alleles of large effect.

Additional References

Investigating arsenic susceptibility from a genetic perspective in *Drosophila* reveals a key role for glutathione synthetase. (2009) (<https://pubmed.ncbi.nlm.nih.gov/18779381>)

RELATED GEPHE

Related Genes

19 (Acetylcholinesterase (Ace-2), alcohol dehydrogenase (Adh), Aldehyde dehydrogenase (Aldh), CG11699, Cyp12d1, Cyp28d1, Cyp28d1-Cyp28d2, cyp6d2, cyp6g1, glutamate-gated chloride channel (GluCl), GSTE1-E10 cluster, kin of ire (kire), para (kdr), PHGPx, resistance to dieldrin, RnrS, SOD1, Ugt86Dd, CHKov1) (<https://www.gephebase.org/search-criteria?/or+Taxon+ID=^7227#/and+Trait=Xenobiotic+resistance/and+groupHaplotypes=true#gephebase-summary-title>)

Related Haplotypes

No matches found.

EXTERNAL LINKS

COMMENTS

There are also insertions of multiple transposable elements at this locus in various lines. This may contribute to differential expression of Gss1 and different responses to arsenic.