

GEPHE SUMMARY

	Gephebase Gene		GepheID
Cyp28d1-Cyp28d2 (#gепhebase-summary-title)		GP00002112	
	Entry Status	Courtier	Main curator
Published			

PHENOTYPIC CHANGE

	Trait Category		
Physiology (#gепhebase-summary-title)			
	Trait		
Xenobiotic resistance (nicotine ; larval stage) (https://www.gephebase.org/search-criteria?/and+Trait=Xenobiotic resistance (nicotine ; larval stage)#gепhebase-summary-title)			
	Trait State in Taxon A		
Drosophila melanogaster susceptible to nicotine			
	Trait State in Taxon B		
Drosophila melanogaster resistant to nicotine			
	Ancestral State		
Taxon A			
	Taxonomic Status		
Intraspecific (#gепhebase-summary-title)			
Taxon A		Taxon B	
	Latin Name		Latin Name
Drosophila melanogaster (#gепhebase-summary-title)		Drosophila melanogaster (#gепhebase-summary-title)	
	Common Name		Common Name
fruit fly		fruit fly	
	Synonyms		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	
	Rank		Rank
species		species	
	Lineage		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; Acalypratae; Ephydroidea; Drosophilidae; Drosophilinae; Drosophilini; Drosophila; Sophophora; melanogaster group; melanogaster subgroup		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; Acalypratae; Ephydroidea; Drosophilidae; Drosophilinae; Drosophilini; Drosophila; Sophophora; melanogaster group; melanogaster subgroup	
	Parent		Parent
melanogaster subgroup () - (Rank: species subgroup) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 32351)		melanogaster subgroup () - (Rank: species subgroup) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 32351)	
	NCBI Taxonomy ID		NCBI Taxonomy ID
7227 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 7227)		7227 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 7227)	
	is Taxon A an Intraspecies?		is Taxon B an Intraspecies?
Yes		Yes	
	Taxon A Description		Taxon B Description
Strain ISO-1		Strains B4 and A1	

GENOTYPIC CHANGE

	Generic Gene Name		UniProtKB Drosophila melanogaster
Cyp28d1		Q9VMT5 (http://www.uniprot.org/uniprot/Q9VMT5)	
	Synonyms		GenebankID or UniProtKB
28d1; CG10833; Dmel\CG10833		33749 (https://www.ncbi.nlm.nih.gov/nucore/33749)	
	String		
7227.FBpp0078698 (http://string-db.org/newstring.cgi/show_network_section.pl?identifier= 7227.FBpp0078698)			
	Sequence Similarities		
Belongs to the cytochrome P450 family.			
	GO - Molecular Function		
GO:0020037 : heme binding (https://www.ebi.ac.uk/QuickGO/term/GO:0020037)			

GO:0005506 : iron ion binding (<https://www.ebi.ac.uk/QuickGO/term/GO:0005506>)
GO:0004497 : monooxygenase activity
(<https://www.ebi.ac.uk/QuickGO/term/GO:0004497>)
GO:0016705 : oxidoreductase activity, acting on paired donors, with incorporation or
reduction of molecular oxygen (<https://www.ebi.ac.uk/QuickGO/term/GO:0016705>)
GO - Biological Process

-

GO - Cellular Component

GO:0005789 : endoplasmic reticulum membrane
(<https://www.ebi.ac.uk/QuickGO/term/GO:0005789>)
GO:0031090 : organelle membrane (<https://www.ebi.ac.uk/QuickGO/term/GO:0031090>)

	Presumptive Null
Unknown (https://www.gephebase.org/search-criteria?/and+Presumptive Null=~Unknown~#gephebase-summary-title)	Molecular Type
Gene Amplification (https://www.gephebase.org/search-criteria?/and+Molecular Type=~Gene Amplification~#gephebase-summary-title)	Aberration Type
Insertion (https://www.gephebase.org/search-criteria?/and+Aberration Type=~Insertion~#gephebase-summary-title)	Insertion Size
1-10 kb	
	Molecular Details of the Mutation
duplication of 6063 bp which includes genes Cyp28d1; Cyp28d2 and CG7742. Associated with increased expression of Cyp28d2 and increased resistance to nicotine	Experimental Evidence
Candidate Gene (https://www.gephebase.org/search-criteria?/and+Experimental Evidence=~Candidate Gene~#gephebase-summary-title)	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

RELATED GEPHE

	Related Genes
19 (Acetylcholinesterase (Ace-2), alcohol dehydrogenase (Adh), Aldehyde dehydrogenase (Aldh), CG11699, Cyp12d1, Cyp28d1, cyp6d2, cyp6g1, glutamate-gated chloride channel (GluCl), GSS (glutathione synthetase), GSTE1-E10 cluster, kin of irre (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
1 (https://www.gephebase.org/search-criteria?/or+Gene Gephebase=~Cyp28d1-Cyp28d2~/and+Taxon ID=~7227~/or+Gene Gephebase=~Cyp28d1-Cyp28d2~/and+Taxon ID=~7227~#gephebase-summary-title)	

EXTERNAL LINKS

COMMENTS

@Parrallelism