

# GEPHE SUMMARY

	Gephebase Gene	GephelD
Cyp28d1-Cyp28d2 ( <a href="https://www.gephebase.org/search-criteria/?and+Gene+Gephebase=Cyp28d1-Cyp28d2">#gephebase-summary-title)</a>	GP00002112	Main curator
	Entry Status	Courtier
Published		

## PHENOTYPIC CHANGE

Trait Category		
Physiology ( <a href="https://www.gephebase.org/search-criteria/?and+Trait+Category=Physiology">#gephebase-summary-title)</a>	Trait	
Xenobiotic resistance (nicotine ; larval stage) ( <a ?and+taxonomic+status='Intraspecific"' href="https://www.gephebase.org/search-criteria/?and+Trait=Xenobiotic+resistance+(nicotine+;+larval+stage)+#gephebase-summary-title)&lt;/a&gt;&lt;/td&gt;&lt;td&gt;Trait State in Taxon A&lt;/td&gt;&lt;td&gt;&lt;/td&gt;&lt;/tr&gt; &lt;tr&gt; &lt;td&gt;Drosophila melanogaster susceptible to nicotine&lt;/td&gt;&lt;td&gt;Trait State in Taxon B&lt;/td&gt;&lt;td&gt;&lt;/td&gt;&lt;/tr&gt; &lt;tr&gt; &lt;td&gt;Drosophila melanogaster resistant to nicotine&lt;/td&gt;&lt;td&gt;Ancestral State&lt;/td&gt;&lt;td&gt;&lt;/td&gt;&lt;/tr&gt; &lt;tr&gt; &lt;td&gt;Taxon A&lt;/td&gt;&lt;td&gt;Taxonomic Status&lt;/td&gt;&lt;td&gt;&lt;/td&gt;&lt;/tr&gt; &lt;tr&gt; &lt;td&gt;Intraspecific (&lt;a href=" https:="" search-criteria="" www.gephebase.org="">#gephebase-summary-title)</a>		
Taxon A		
Drosophila melanogaster ( <a href="https://www.gephebase.org/search-criteria/?and+Taxon+and+Synonyms=Drosophila+melanogaster">#gephebase-summary-title)</a>	Latin Name	Latin Name
fruit fly	Common Name	Common Name
Sophophora melanogaster; fruit fly; Drosophila melanogaster Meigen, 1830; Sophophora melanogaster (Meigen, 1830); Drosophila melangaster	Synonyms	Synonyms
species	Rank	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	Lineage
melanogaster subgroup () - (Rank: species subgroup) ( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 32351">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 32351</a> )	Parent	Parent
7227 ( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 7227">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 7227</a> )	NCBI Taxonomy ID	NCBI Taxonomy ID
Yes	is Taxon A an Infraspecies?	is Taxon B an Infraspecies?
Strain ISO-1	Taxon A Description	Taxon B Description
	Strains B4 and A1	

## GENOTYPIC CHANGE

Cyp28d1	Generic Gene Name	UniProtKB Drosophila melanogaster
28d1; CG10833; Dmel\CG10833	Synonyms	GenebankID or UniProtKB
7227.FBpp0078698 ( <a href="http://string-db.org/newstring_cgi/show_network_section.pl?identifier= 7227.FBpp0078698">http://string-db.org/newstring_cgi/show_network_section.pl?identifier= 7227.FBpp0078698</a> )	String	
Belongs to the cytochrome P450 family.	Sequence Similarities	
GO:0020037 : heme binding ( <a href="https://www.ebi.ac.uk/QuickGO/term/GO:0020037">https://www.ebi.ac.uk/QuickGO/term/GO:0020037</a> )	GO - Molecular Function	

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

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