

GEPHE SUMMARY

<p>lr75b (https://www.gephebase.org/search-criteria?/and+Gene) Gephebase=[^]lr75b[^]#gephebase-summary-title)</p> <p>Published</p>	<p>Gephebase Gene</p> <p>Entry Status</p>	<p>GP00001702</p> <p>Courtier</p>	<p>GepheID</p> <p>Main curator</p>
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PHENOTYPIC CHANGE

Trait #1	Trait Category
Physiology (https://www.gephebase.org/search-criteria?/and+Trait) Category= [^] Physiology [^] #gephebase-summary-title)	Trait
Olfaction (https://www.gephebase.org/search-criteria?/and+Trait) = [^] Olfaction [^] #gephebase-summary-title)	Trait State in Taxon A
no response to hexanoic acid	Trait State in Taxon B
response to hexanoic acid	

Trait #2	Trait Category
Behavior, Physiology (https://www.gephebase.org/search-criteria?/and+Trait) Category= [^] Behavior [^] /and+Trait Category= [^] Physiology [^] #gephebase-summary-title)	Trait
Oviposition site preference (https://www.gephebase.org/search-criteria?/and+Trait) = [^] Oviposition site preference [^] #gephebase-summary-title)	Trait State in Taxon A
oviposition preference for butyric acid (versus hexanoic acid)	Trait State in Taxon B
oviposition preference for hexanoic acid (versus butyric acid)	

Taxon A	Ancestral State
Interspecific (https://www.gephebase.org/search-criteria?/and+Taxonomic) Status= [^] Interspecific [^] #gephebase-summary-title)	Taxonomic Status

Taxon A		Taxon B
Drosophila melanogaster (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms= [^] Drosophila melanogaster [^] #gephebase-summary-title)	Latin Name	Drosophila sechellia (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms= [^] Drosophila sechellia [^] #gephebase-summary-title)
fruit fly	Common Name	-
Sophophora melanogaster; fruit fly; Drosophila melanogaster Meigen, 1830; Sophophora melanogaster (Meigen, 1830); Drosophila melangaster	Synonyms	Drosophila sechellia Tsacas and Bachli, 1981
species	Rank	species
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	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
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)
7227 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=7227)	NCBI Taxonomy ID	7238 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=7238)
is Taxon A an Infrapopulation?		is Taxon B an Infrapopulation?
No		No

GENOTYPIC CHANGE

Generic Gene Name: Ir75b
 UniProtKB Drosophila melanogaster: B7Z069 (<http://www.uniprot.org/uniprot/B7Z069>)
 Synonyms: Ir75abc; IR75abc; CG14586; CG14586-B; CG42643; DmelIR75b; DmelCG42643; IR75b; A0A1S6EMU3 (<https://www.ncbi.nlm.nih.gov/nucore/A0A1S6EMU3>)
 GenebankID or UniProtKB: Dmel_CG42643
 String: 7227.FBpp0291499 (http://string-db.org/newstring.cgi/show_network_section.pl?identifier=7227.FBpp0291499)
 Sequence Similarities: -
 GO - Molecular Function: GO:0015276 : ligand-gated ion channel activity (<https://www.ebi.ac.uk/QuickGO/term/GO:0015276>); GO:0004970 : ionotropic glutamate receptor activity (<https://www.ebi.ac.uk/QuickGO/term/GO:0004970>)
 GO - Biological Process: GO:0050907 : detection of chemical stimulus involved in sensory perception (<https://www.ebi.ac.uk/QuickGO/term/GO:0050907>)
 GO - Cellular Component: GO:0016021 : integral component of membrane (<https://www.ebi.ac.uk/QuickGO/term/GO:0016021>)
 Presumptive Null: No (<https://www.gephebase.org/search-criteria?/and+Presumptive Null=^No^#gephebase-summary-title>)
 Molecular Type: Coding (<https://www.gephebase.org/search-criteria?/and+Molecular Type=^Coding^#gephebase-summary-title>)
 Aberration Type: SNP (<https://www.gephebase.org/search-criteria?/and+Aberration Type=^SNP^#gephebase-summary-title>)
 SNP Coding Change: Nonsynonymous
 Molecular Details of the Mutation: T523S in the LBD domain - caused by C1568G
 Experimental Evidence: Candidate Gene (<https://www.gephebase.org/search-criteria?/and+Experimental Evidence=^Candidate Gene^#gephebase-summary-title>)

	Taxon A	Taxon B	Position
Codon	-	-	-
Amino-acid	-	-	-

Main Reference: Evolution of Acid-Sensing Olfactory Circuits in Drosophilids. (2017) (<https://pubmed.ncbi.nlm.nih.gov/28111079>)
 Authors: Prieto-Godino LL; Rytz R; Cruchet S; Bargeton B; Abuin L; Silbering AF; Ruta V; Dal Peraro M; Benton R
 Abstract: Animals adapt their behaviors to specific ecological niches, but the genetic and cellular basis of nervous system evolution is poorly understood. We have compared the olfactory circuits of the specialist *Drosophila sechellia*-which feeds exclusively on *Morinda citrifolia* fruit-with its generalist cousins *D. melanogaster* and *D. simulans*. We show that *D. sechellia* exhibits derived odor-evoked attraction and physiological sensitivity to the abundant *Morinda* volatile hexanoic acid and characterize how the responsible sensory receptor (the variant ionotropic glutamate receptor IR75b) and attraction-mediating circuit have evolved. A single amino acid change in IR75b is sufficient to recode it as a hexanoic acid detector. Expanded representation of this sensory pathway in the brain relies on additional changes in the IR75b promoter and trans-acting loci. By contrast, higher-order circuit adaptations are not apparent, suggesting conserved central processing. Our work links olfactory ecology to structural and regulatory genetic changes influencing nervous system anatomy and function.
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 Additional References: Odor-regulated oviposition behavior in an ecological specialist. (2023) (<https://pubmed.ncbi.nlm.nih.gov/37236992>); Molecular reconstruction of recurrent evolutionary switching in olfactory receptor specificity. (2021) (<https://pubmed.ncbi.nlm.nih.gov/34677122>)

RELATED GEPHE

Related Genes: 2 (Ir75a, Or22a) (<https://www.gephebase.org/search-criteria?/or+Taxon ID=^7227^/and+Trait=Olfaction/or+Taxon ID=^7227^/and+Trait=Oviposition site preference/or+Taxon ID=^7238^/and+Trait=Olfaction/or+Taxon ID=^7238^/and+Trait=Oviposition site preference/and+groupHaplotypes=true#gephebase-summary-title>)
 Related Haplotypes: No matches found.

EXTERNAL LINKS

COMMENTS

The difference in hexanoic acid olfaction is associated with the amino acid change T523S. The difference in oviposition site is associated with Ir75b full coding region and the effect of T523S on oviposition preference has not been tested.