

## GEPHE SUMMARY

<p>Ir75a (<a href="https://www.gephebase.org/search-criteria?/and+Gene+Gephebase=~Ir75a^#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Gene+Gephebase=~Ir75a^#gephebase-summary-title</a>)</p> <p>Published</p>	<p>Gephebase Gene</p> <p>Entry Status</p>	<p>GP00001701</p> <p>Courtier</p>	<p>GepheID</p> <p>Main curator</p>
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## PHENOTYPIC CHANGE

<p>Physiology (<a href="https://www.gephebase.org/search-criteria?/and+Trait+Category=~Physiology^#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Trait+Category=~Physiology^#gephebase-summary-title</a>)</p> <p>Olfaction (<a href="https://www.gephebase.org/search-criteria?/and+Trait=~Olfaction^#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Trait=~Olfaction^#gephebase-summary-title</a>)</p> <p>response to acetic acid</p> <p>no response to acetic acid</p> <p>Taxon A</p> <p>Interspecific (<a href="https://www.gephebase.org/search-criteria?/and+Taxonomic+Status=~Interspecific^#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Taxonomic+Status=~Interspecific^#gephebase-summary-title</a>)</p>	<p>Trait Category</p> <p>Trait</p> <p>Trait State in Taxon A</p> <p>Trait State in Taxon B</p> <p>Ancestral State</p> <p>Taxonomic Status</p>	<p>Physiology</p> <p>Olfaction</p> <p>response to acetic acid</p> <p>no response to acetic acid</p> <p>Taxon A</p> <p>Interspecific</p>	<p>Taxon B</p> <p>Latin Name</p> <p>Common Name</p> <p>Synonyms</p> <p>Rank</p> <p>Lineage</p> <p>Parent</p> <p>NCBI Taxonomy ID</p> <p>is Taxon B an Infrappecies?</p>
<p><i>Drosophila melanogaster</i> (<a href="https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=~Drosophila+melanogaster^#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=~Drosophila+melanogaster^#gephebase-summary-title</a>)</p> <p>fruit fly</p> <p>Sophophora melanogaster; fruit fly; <i>Drosophila melanogaster</i> Meigen, 1830; <i>Sophophora melanogaster</i> (Meigen, 1830); <i>Drosophila melangaster</i></p> <p>species</p> <p>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; <i>Drosophila</i>; <i>Sophophora</i>; melanogaster group; melanogaster subgroup</p> <p>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>)</p> <p>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>)</p> <p>No</p> <p>is Taxon A an Infrappecies?</p>	<p>Latin Name</p> <p>Common Name</p> <p>Synonyms</p> <p>Rank</p> <p>Lineage</p> <p>Parent</p> <p>NCBI Taxonomy ID</p> <p>is Taxon A an Infrappecies?</p>	<p><i>Drosophila sechellia</i> (<a href="https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=~Drosophila+sechellia^#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=~Drosophila+sechellia^#gephebase-summary-title</a>)</p> <p>-</p> <p><i>Drosophila sechellia</i> Tsacas and Bachli, 1981</p> <p>species</p> <p>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; <i>Drosophila</i>; <i>Sophophora</i>; melanogaster group; melanogaster subgroup</p> <p>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>)</p> <p>7238 (<a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=7238">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=7238</a>)</p> <p>No</p> <p>is Taxon B an Infrappecies?</p>	<p>NCBI Taxonomy ID</p> <p>is Taxon B an Infrappecies?</p>

## GENOTYPIC CHANGE

<p>Ir75a</p> <p>CG14585; DmellIR75a; DmellCG14585; IR75a; Ir75abc; IR75abc</p> <p>7227.FBpp0271900 (<a href="http://string-db.org/newstring.cgi/show_network_section.pl?identifier=7227.FBpp0271900">http://string-db.org/newstring.cgi/show_network_section.pl?identifier=7227.FBpp0271900</a>)</p> <p>Belongs to the glutamate-gated ion channel (TC 1.A.10.1) family.</p> <p>GO:0015276 : ligand-gated ion channel activity (<a href="https://www.ebi.ac.uk/QuickGO/term/GO:0015276">https://www.ebi.ac.uk/QuickGO/term/GO:0015276</a>)</p> <p>GO:0004984 : olfactory receptor activity (<a href="https://www.ebi.ac.uk/QuickGO/term/GO:0004984">https://www.ebi.ac.uk/QuickGO/term/GO:0004984</a>)</p>	<p>Generic Gene Name</p> <p>Synonyms</p> <p>String</p> <p>Sequence Similarities</p> <p>GO - Molecular Function</p>	<p>UniProtKB <i>Drosophila melanogaster</i></p> <p>Q9VVL1 (<a href="http://www.uniprot.org/uniprot/Q9VVL1">http://www.uniprot.org/uniprot/Q9VVL1</a>)</p> <p>0</p> <p>GenebankID or UniProtKB</p>
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GO:0004971 : AMPA glutamate receptor activity  
(<https://www.ebi.ac.uk/QuickGO/term/GO:0004971>)

GO - Biological Process

GO:0007605 : sensory perception of sound  
(<https://www.ebi.ac.uk/QuickGO/term/GO:0007605>)

GO:0050907 : detection of chemical stimulus involved in sensory perception  
(<https://www.ebi.ac.uk/QuickGO/term/GO:0050907>)

GO:0050911 : detection of chemical stimulus involved in sensory perception of smell  
(<https://www.ebi.ac.uk/QuickGO/term/GO:0050911>)

GO - Cellular Component

GO:0016021 : integral component of membrane  
(<https://www.ebi.ac.uk/QuickGO/term/GO:0016021>)

GO:0005886 : plasma membrane (<https://www.ebi.ac.uk/QuickGO/term/GO:0005886>)

GO:0005887 : integral component of plasma membrane  
(<https://www.ebi.ac.uk/QuickGO/term/GO:0005887>)

GO:0030425 : dendrite (<https://www.ebi.ac.uk/QuickGO/term/GO:0030425>)

GO:0044297 : cell body (<https://www.ebi.ac.uk/QuickGO/term/GO:0044297>)

GO:0032281 : AMPA glutamate receptor complex  
(<https://www.ebi.ac.uk/QuickGO/term/GO:0032281>)

GO:0071683 : sensory dendrite (<https://www.ebi.ac.uk/QuickGO/term/GO:0071683>)

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

T289S and/or Q536K and/or F538L - introduction of these three amino acid changes in the D. melanogaster protein is sufficient to confer response indistinguishable from the one of D. sechellia

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

Olfactory receptor pseudo-pseudogenes. (2016) (<https://pubmed.ncbi.nlm.nih.gov/27776356>)

Authors

Prieto-Godino LL; Rytz R; Bargeton B; Abuin L; Arguello JR; Peraro MD; Benton R

Abstract

Pseudogenes are generally considered to be non-functional DNA sequences that arise through nonsense or frame-shift mutations of protein-coding genes. Although certain pseudogene-derived RNAs have regulatory roles, and some pseudogene fragments are translated, no clear functions for pseudogene-derived proteins are known. Olfactory receptor families contain many pseudogenes, which reflect low selection pressures on loci no longer relevant to the fitness of a species. Here we report the characterization of a pseudogene in the chemosensory variant ionotropic glutamate receptor repertoire of *Drosophila sechellia*, an insect endemic to the Seychelles that feeds almost exclusively on the ripe fruit of *Morinda citrifolia*. This locus, *D. sechellia* *Ir75a*, bears a premature termination codon (PTC) that appears to be fixed in the population. However, *D. sechellia* *Ir75a* encodes a functional receptor, owing to efficient translational read-through of the PTC. Read-through is detected only in neurons and is independent of the type of termination codon, but depends on the sequence downstream of the PTC. Furthermore, although the intact *Drosophila melanogaster* *Ir75a* orthologue detects acetic acid—a chemical cue important for locating fermenting food found only at trace levels in *Morinda* fruit—*D. sechellia* *Ir75a* has evolved distinct odour-tuning properties through amino-acid changes in its ligand-binding domain. We identify functional PTC-containing loci within different olfactory receptor repertoires and species, suggesting that such ‘pseudo-pseudogenes’ could represent a widespread phenomenon.

Additional References

RELATED GEPHE

Related Genes

2 (Or22a, Ir75b) (<https://www.gephebase.org/search-criteria?/or+Taxon ID=~7227^/and+Trait=Olfaction/or+Taxon ID=~7238^/and+Trait=Olfaction/and+groupHaplotypes=true#gephebase-summary-title>)

Related Haplotypes

No matches found.

EXTERNAL LINKS

COMMENTS

The *D. sechellia* *Ir75a* gene contains a premature stop codon but is nevertheless transcribed into a full protein in neurons