

## GEPHE SUMMARY

desatF ( <a href="https://www.gephebase.org/search-criteria?/and+Gene+Gephebase=^desatF^#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Gene+Gephebase=^desatF^#gephebase-summary-title</a> )	Gephebase Gene	GP00000220	GepheID
Published	Entry Status	Martin	Main curator

## PHENOTYPIC CHANGE

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> )	Trait Category		
Pheromone production ( <a href="https://www.gephebase.org/search-criteria?/and+Trait=^Pheromone+production^#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Trait=^Pheromone+production^#gephebase-summary-title</a> )	Trait		
Drosophila takahashii and non-Sophophora species	Trait State in Taxon A		
Drosophila (Sophophora) spp.	Trait State in Taxon B		
Taxon A	Ancestral State		
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> )	Taxonomic Status		
		Taxon A	Taxon B
	Latin Name		Latin Name
Drosophila takahashii ( <a href="https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=^Drosophila+takahashii^#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=^Drosophila+takahashii^#gephebase-summary-title</a> )	Drosophila ( <a href="https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=^Drosophila^#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=^Drosophila^#gephebase-summary-title</a> )		
-	Common Name	-	Common Name
-	Synonyms	Drosophila (Drosophila); Drosophila (Drosophila) Fallen, 1823	Synonyms
species	Rank	subgenus	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; Acalyprtratae; Ephydroidea; Drosophilidae; Drosophilinae; Drosophilini; Drosophila; Sophophora; melanogaster group; takahashii 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; Acalyprtratae; Ephydroidea; Drosophilidae; Drosophilinae; Drosophilini; Drosophila	Lineage
takahashii subgroup () - (Rank: species subgroup) ( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=32354">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=32354</a> )	Parent	Drosophila (fruit flies) - (Rank: genus) ( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=7215">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=7215</a> )	Parent
29030 ( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=29030">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=29030</a> )	NCBI Taxonomy ID	32281 ( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=32281">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=32281</a> )	NCBI Taxonomy ID
No	is Taxon A an Intraspecies?	No	is Taxon B an Intraspecies?

## GENOTYPIC CHANGE

desatF	Generic Gene Name	UniProtKB Drosophila melanogaster
-	Synonyms	A7DZ97 ( <a href="http://www.uniprot.org/uniprot/A7DZ97">http://www.uniprot.org/uniprot/A7DZ97</a> )
-	String	EDV51348 ( <a href="https://www.ncbi.nlm.nih.gov/nucleotide/EDV51348">https://www.ncbi.nlm.nih.gov/nucleotide/EDV51348</a> )
	Sequence Similarities	
Belongs to the fatty acid desaturase type 1 family.		
GO:0016717 : oxidoreductase activity, acting on paired donors, with oxidation of a pair of donors resulting in the reduction of molecular oxygen to two molecules of water ( <a href="https://www.ebi.ac.uk/QuickGO/term/GO:0016717">https://www.ebi.ac.uk/QuickGO/term/GO:0016717</a> )	GO - Molecular Function	
GO:0006633 : fatty acid biosynthetic process ( <a href="https://www.ebi.ac.uk/QuickGO/term/GO:0006633">https://www.ebi.ac.uk/QuickGO/term/GO:0006633</a> )	GO - Biological Process	
	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](https://www.gephebase.org/search-criteria?/and+Presumptive+Null+No^#gephebase-summary-title))

Molecular Type

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

Aberration Type

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

Deletion Size

1-9 bp

Molecular Details of the Mutation

Inactivation of DSX-binding site

Experimental Evidence

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

Main Reference

Rapid evolution of sex pheromone-producing enzyme expression in *Drosophila*. (2009) (<https://pubmed.ncbi.nlm.nih.gov/19652700>)

Authors

Shirangi TR; Dufour HD; Williams TM; Carroll SB

Abstract

A wide range of organisms use sex pheromones to communicate with each other and to identify appropriate mating partners. While the evolution of chemical communication has been suggested to cause sexual isolation and speciation, the mechanisms that govern evolutionary transitions in sex pheromone production are poorly understood. Here, we decipher the molecular mechanisms underlying the rapid evolution in the expression of a gene involved in sex pheromone production in *Drosophilid* flies. Long-chain cuticular hydrocarbons (e.g., dienes) are produced female-specifically, notably via the activity of the desaturase DESAT-F, and are potent pheromones for male courtship behavior in *Drosophila melanogaster*. We show that across the genus *Drosophila*, the expression of this enzyme is correlated with long-chain diene production and has undergone an extraordinary number of evolutionary transitions, including six independent gene inactivations, three losses of expression without gene loss, and two transitions in sex-specificity. Furthermore, we show that evolutionary transitions from monomorphism to dimorphism (and its reversion) in *desatF* expression involved the gain (and the inactivation) of a binding-site for the sex-determination transcription factor, DOUBLESEX. In addition, we documented a surprising example of the gain of particular cis-regulatory motifs of the *desatF* locus via a set of small deletions. Together, our results suggest that frequent changes in the expression of pheromone-producing enzymes underlie evolutionary transitions in chemical communication, and reflect changing regimes of sexual selection, which may have contributed to speciation among *Drosophila*.

Additional References

## RELATED GEPHE

No matches found.

Related Genes

No matches found.

Related Haplotypes

## EXTERNAL LINKS

## COMMENTS

@SexualTrait