

GEPHE SUMMARY

		Gephebase Gene	GepheID
ocimene synthase (OS) (https://www.gephebase.org/search-criteria?/and+Gene)		GP00002426	
Gephebase="ocimene synthase (OS)"#gephebase-summary-title)			Main curator
	Entry Status	Courtier	
Published			

PHENOTYPIC CHANGE

		Trait Category	
Physiology (https://www.gephebase.org/search-criteria?/and+Trait)			
Category="Physiology"#gephebase-summary-title)		Trait	
Pheromone production (cuticular hydrocarbons ; beta-ocimene)			
(<a (cuticular="" ;="" beta-ocimene)"#gephebase-summary-title"="" href="https://www.gephebase.org/search-criteria?/and+Trait=" hydrocarbons="" pheromone="" production="">https://www.gephebase.org/search-criteria?/and+Trait="Pheromone production (cuticular hydrocarbons ; beta-ocimene)"#gephebase-summary-title)		Trait State in Taxon A	
Heliconius melpomene - production of beta-ocimene by male abdomen		Trait State in Taxon B	
Heliconius cydno - no production of beta-ocimene by male abdomen		Ancestral State	
Taxon A		Taxonomic Status	
Interspecific (https://www.gephebase.org/search-criteria?/and+Taxonomic)			
Status="Interspecific"#gephebase-summary-title)			
Taxon A		Taxon B	
	Latin Name		Latin Name
Heliconius melpomene		Heliconius cydno	
(https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms="Heliconius melpomene"#gephebase-summary-title)		(<a cydno"#gephebase-summary-title"="" heliconius="" href="https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=">https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms="Heliconius cydno"#gephebase-summary-title)	
	Common Name		Common Name
postman butterfly		-	
	Synonyms		Synonyms
postman butterfly; common postman; Heliconius melpomene (Linnaeus, 1758)		Heliconius cydno Doubleday, 1847	
	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; Amphimesnoptera; Lepidoptera; Glossata; Neolepidoptera; Heteroneura; Dityrsia; Obtectomera; Papilionoidea; Nymphalidae; Heliconiinae; Heliconiini; Heliconius		cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Protostomia; Ecdysozoa; Panarthropoda; Arthropoda; Mandibulata; Pancrustacea; Hexapoda; Insecta; Dicondylia; Pterygota; Neoptera; Holometabola; Amphimesnoptera; Lepidoptera; Glossata; Neolepidoptera; Heteroneura; Dityrsia; Obtectomera; Papilionoidea; Nymphalidae; Heliconiinae; Heliconiini; Heliconius	
	Parent		Parent
Heliconius () - (Rank: genus)		Heliconius () - (Rank: genus)	
(https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=33416)		(https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=33416)	
	NCBI Taxonomy ID		NCBI Taxonomy ID
34740		33424	
(https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=34740)		(https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=33424)	
	is Taxon A an Intraspecies?		is Taxon B an Intraspecies?
No		No	

GENOTYPIC CHANGE

		Generic Gene Name	UniProtKB Matsumurasca onukii
TPS		A0A7D0AGU9 (http://www.uniprot.org/uniprot/A0A7D0AGU9)	
	Synonyms		GenebankID or UniProtKB
-		0	
	String		
-			
		Sequence Similarities	
Belongs to the FPP/GGPP synthase family.			
		GO - Molecular Function	
GO:0046872 : metal ion binding (https://www.ebi.ac.uk/QuickGO/term/GO:0046872)			
GO:0016787 : hydrolase activity (https://www.ebi.ac.uk/QuickGO/term/GO:0016787)			
		GO - Biological Process	
GO:0008299 : isoprenoid biosynthetic process			
(https://www.ebi.ac.uk/QuickGO/term/GO:0008299)			
		GO - Cellular Component	
-			

No (<https://www.gephebase.org/search-criteria?/and+Presumptive Null=^No^#gephebase-summary-title>)

Presumptive Null

Coding (<https://www.gephebase.org/search-criteria?/and+Molecular Type=^Coding^#gephebase-summary-title>)

Molecular Type

Unknown (<https://www.gephebase.org/search-criteria?/and+Aberration Type=^Unknown^#gephebase-summary-title>)

Aberration Type

gain of expression - in vitro assay of the protein activity in *E. coli* - several amino acid changes between the 2 species

Molecular Details of the Mutation

Linkage Mapping (<https://www.gephebase.org/search-criteria?/and+Experimental Evidence=^Linkage Mapping^#gephebase-summary-title>)

Experimental Evidence

A novel terpene synthase controls differences in anti-aphrodisiac pheromone production between closely related *Heliconius* butterflies. (2021) (<https://pubmed.ncbi.nlm.nih.gov/33465061>)

Main Reference

Darragh K; Orteu A; Black D; Byers KJRP; Szczerbowski D; Warren IA; Rastas P; Pinharanda A; Davey JW; Fernanda Garza S; Abondano Almeida D; Merrill RM; McMillan WO; Schulz S; Jiggins CD

Authors

Plants and insects often use the same compounds for chemical communication, but not much is known about the genetics of convergent evolution of chemical signals. The terpene (E)- β -ocimene is a common component of floral scent and is also used by the butterfly *Heliconius melpomene* as an anti-aphrodisiac pheromone. While the biosynthesis of terpenes has been described in plants and microorganisms, few terpene synthases (TPSs) have been identified in insects. Here, we study the recent divergence of 2 species, *H. melpomene* and *Heliconius cydno*, which differ in the presence of (E)- β -ocimene: combining linkage mapping, gene expression, and functional analyses, we identify 2 novel TPSs. Furthermore, we demonstrate that one, HmelOS, is able to synthesise (E)- β -ocimene in vitro. We find no evidence for TPS activity in HcydOS (HmelOS ortholog of *H. cydno*), suggesting that the loss of (E)- β -ocimene in this species is the result of coding, not regulatory, differences. The TPS enzymes we discovered are unrelated to previously described plant and insect TPSs, demonstrating that chemical convergence has independent evolutionary origins.

Abstract

Additional References

RELATED GEPHE

No matches found.

Related Genes

No matches found.

Related Haplotypes

EXTERNAL LINKS

COMMENTS

@SexualTrait