

LIMONENE-MYRCENE SYNTHASE (LMS) (https://www.gephebase.org/search-criteria?/and+Gene+Gephebase=~LIMONENE-MYRCENE+SYNTHASE+(LMS)^#gephebase-summary-title)	Gephebase Gene GP00001761 Main curator Courtier
Published	Entry Status

Trait Category	
Physiology (https://www.gephebase.org/search-criteria?/and+Trait+Category=^Physiology^#gephebase-summary-title)	
Trait	
Fragrance (floral terpenoid volatiles; D -limonene and beta-myrcene) (https://www.gephebase.org/search-criteria?/and+Trait=^Fragrance (floral terpenoid volatiles; D -limonene and beta-myrcene)^#gephebase-summary-title)	
Trait State in Taxon A	
scent	
Trait State in Taxon B	
no scent	
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
Erythranthe lewisii (https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=^Erythranthe lewisii^#gephebase-summary-title)	Erythranthe cardinalis (https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=^Erythranthe cardinalis^#gephebase-summary-title)
Common Name	Common Name
-	-
Synonyms	Synonyms
Mimulus lewisii; Erythranthe lewisii (Pursh) G.L.Nesom & N.S.Fraga; Mimulus lewisii Pursh	Mimulus cardinalis; Erythranthe cardinalis (Douglas ex Benth.) Spach; Mimulus cardinalis Douglas ex Benth.
Rank	Rank
species	species
Lineage	Lineage
cellular organisms; Eukaryota; Viridiplantae; Streptophyta; Streptophytina; Embryophyta; Tracheophyta; Euphyllophyta; Spermatophyta; Magnoliophyta; Mesangiospermae; eudicotyledons; Gunneridae; Pentapetalae; asterids; lamiids; Lamiales; Phrymaceae; Erythranthe	cellular organisms; Eukaryota; Viridiplantae; Streptophyta; Streptophytina; Embryophyta; Tracheophyta; Euphyllophyta; Spermatophyta; Magnoliophyta; Mesangiospermae; eudicotyledons; Gunneridae; Pentapetalae; asterids; lamiids; Lamiales; Phrymaceae; Erythranthe
Parent	Parent
Erythranthe () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=1502711)	Erythranthe () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=1502711)
NCBI Taxonomy ID	NCBI Taxonomy ID
69919 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=69919)	188299 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=188299)
is Taxon A an Intraspecies?	is Taxon B an Intraspecies?
No	No

LMS	Generic Gene Name	UniProtKB Erythranthe lewisii
-	Synonyms	GenebankID or UniProtKB Erythranthe lewisii
-	String	W6A2K5 (https://www.ncbi.nlm.nih.gov/nuccore/W6A2K5)
	Sequence Similarities	
Belongs to the terpene synthase family.		
	GO - Molecular Function	
GO:0000287 : magnesium ion binding (https://www.ebi.ac.uk/QuickGO/term/GO:0000287)		
GO:0010333 : terpene synthase activity (https://www.ebi.ac.uk/QuickGO/term/GO:0010333)		
	GO - Biological Process	
-		

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Presumptive Null

Yes (<https://www.gephebase.org/search-criteria?/and+Presumptive Null=~Yes^#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

Nonsense

Molecular Details of the Mutation

G66T transversion mutation in exon 3 of McLMS (KM659024) that results in a nonsense mutation in the McLMS protein (G201X)

Experimental Evidence

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

	Taxon A	Taxon B	Position
Codon	GGA	TGA	66
Amino-acid	Gly	STP	201

Main Reference

Floral volatile alleles can contribute to pollinator-mediated reproductive isolation in monkeyflowers (*Mimulus*). (2014) (<https://pubmed.ncbi.nlm.nih.gov/25319242>)

Authors

Byers KJ; Vela JP; Peng F; Riffell JA; Bradshaw HD

Abstract

Pollinator-mediated reproductive isolation is a major factor in driving the diversification of flowering plants. Studies of floral traits involved in reproductive isolation have focused nearly exclusively on visual signals, such as flower color. The role of less obvious signals, such as floral scent, has been studied only recently. In particular, the genetics of floral volatiles involved in mediating differential pollinator visitation remains unknown. The bumblebee-pollinated *Mimulus lewisii* and hummingbird-pollinated *Mimulus cardinalis* are a model system for studying reproductive isolation via pollinator preference. We have shown that these two species differ in three floral terpenoid volatiles - d-limonene, β -myrcene, and E- β -ocimene - that are attractive to bumblebee pollinators. By genetic mapping and in vitro analysis of enzyme activity we demonstrate that these interspecific differences are consistent with allelic variation at two loci, LIMONENE-MYRCENE SYNTHASE (LMS) and OCIMENE SYNTHASE (OS). *Mimulus lewisii* LMS (MILMS) and OS (MIOS) are expressed most strongly in floral tissue in the last stages of floral development. *Mimulus cardinalis* LMS (McLMS) is weakly expressed and has a nonsense mutation in exon 3. *Mimulus cardinalis* OS (McOS) is expressed similarly to MIOS, but the encoded McOS enzyme produces no E- β -ocimene. Recapitulating the M. $\hat{A}$ cardinalis phenotype by reducing the expression of MILMS by RNA interference in transgenic M. $\hat{A}$ lewisii produces no behavioral difference in pollinating bumblebees; however, reducing MIOS expression produces a 6% decrease in visitation. Allelic variation at the OCIMENE SYNTHASE locus is likely to contribute to differential pollinator visitation, and thus promote reproductive isolation between M. $\hat{A}$ lewisii and M. $\hat{A}$ cardinalis. OCIMENE SYNTHASE joins a growing list of ‘speciation genes’ (‘barrier genes’) in flowering plants.

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Additional References

RELATED GEPHE

Related Genes

1 (OCYMENE SYNTHASE (OS)) (<https://www.gephebase.org/search-criteria?/or+Taxon ID=~69919^/and+Trait=Frangrance/or+Taxon ID=~188299^/and+Trait=Frangrance/and+groupHaplotypes=true#gephebase-summary-title>)

Related Haplotypes

No matches found.

EXTERNAL LINKS

COMMENTS