

GEPHE SUMMARY

Gephebase Gene
 OCYMENE SYNTHASE (OS) (<https://www.gephebase.org/search-criteria?/and+Gene>
 Gephebase="OCYMENE SYNTHASE (OS)"#gephebase-summary-title) GP00001763 GepheID
 Entry Status Courtier Main curator
 Published

PHENOTYPIC CHANGE

Trait Category
 Physiology (<https://www.gephebase.org/search-criteria?/and+Trait>
 Category="Physiology"#gephebase-summary-title)
 Trait
 Fragrance (floral terpenoid volatiles; E- beta-ocimene) ([https://www.gephebase.org/search-criteria?/and+Trait="Fragrance \(floral terpenoid volatiles; E- beta-ocimene\)"#gephebase-summary-title](https://www.gephebase.org/search-criteria?/and+Trait=))
 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 | Latin Name | Taxon B | Latin Name |
|--|--|---------|------------|
| Erythranthe lewisii (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms="Erythranthe lewisii"#gephebase-summary-title) | Erythranthe bicolor (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms="Erythranthe bicolor"#gephebase-summary-title) | | |
| - | - | | |
| Mimulus lewisii; Erythranthe lewisii (Pursh) G.L.Nesom & N.S.Fraga; Mimulus lewisii Pursh | Mimulus bicolor; Erythranthe bicolor (Hartw. ex Benth.) G.L.Nesom & N.S.Fraga; Mimulus bicolor Hartw. ex Benth. | | |
| Rank | Rank | | |
| species | species | | |
| Lineage cellular organisms; Eukaryota; Viridiplantae; Streptophyta; Streptophytina; Embryophyta; Tracheophyta; Euphyllophyta; Spermatophyta; Magnoliophyta; Mesangiospermae; eudicotyledons; Gunneridae; Pentapetalae; asterids; lamiids; Lamiales; Phrymaceae; Erythranthe | Lineage cellular organisms; Eukaryota; Viridiplantae; Streptophyta; Streptophytina; Embryophyta; Tracheophyta; Euphyllophyta; Spermatophyta; Magnoliophyta; Mesangiospermae; eudicotyledons; Gunneridae; Pentapetalae; asterids; lamiids; Lamiales; Phrymaceae; Erythranthe | | |
| Parent Erythranthe () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=1502711) | Parent Erythranthe () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=1502711) | | |
| NCBI Taxonomy ID 69919 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=69919) | NCBI Taxonomy ID 188297 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=188297) | | |
| is Taxon A an Intraspecies? | is Taxon B an Intraspecies? | | |
| No | No | | |

GENOTYPIC CHANGE

Generic Gene Name
 TPS02 P0CJ43 (<http://www.uniprot.org/uniprot/P0CJ43>) UniProtKB Arabidopsis thaliana
 Synonyms
 - 0 GenebankID or UniProtKB
 String
 -
 Sequence Similarities
 Belongs to the terpene synthase family. Tpsb subfamily.
 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
 GO:0016114 : terpenoid biosynthetic process
 (<https://www.ebi.ac.uk/QuickGO/term/GO:0016114>)

GO:0009507 : chloroplast (<https://www.ebi.ac.uk/QuickGO/term/GO:0009507>)Yes (<https://www.gephebase.org/search-criteria?/and+Presumptive+Null=~Yes^#gephebase-summary-title>)Coding (<https://www.gephebase.org/search-criteria?/and+Molecular+Type=~Coding^#gephebase-summary-title>)Insertion (<https://www.gephebase.org/search-criteria?/and+Aberration+Type=~Insertion^#gephebase-summary-title>)

1-9 bp

2-bp insertion in the second exon, producing a frameshift mutation and premature termination

Candidate Gene (<https://www.gephebase.org/search-criteria?/and+Experimental+Evidence=~Candidate+Gene^#gephebase-summary-title>)Less is more: Independent loss-of-function OCIMENE SYNTHASE alleles parallel pollination syndrome diversification in monkeyflowers (*Mimulus*). (2017) (<https://pubmed.ncbi.nlm.nih.gov/28724593/>)

Peng F; Byers KJRP; Bradshaw HD

Pollinator-mediated selection on flower phenotypes (e.g., shape, color, scent) is key to understanding the adaptive radiation of angiosperms, many of which have evolved specialized relationships with a particular guild of animal pollinators (e.g., birds, bats, moths, bees). E-Î²-Ocimene, a monoterpene produced by OCIMENE SYNTHASE (OS) in *Mimulus lewisii*, is a floral scent important in attracting the species' bumblebee pollinators. The taxa closely related to *M. lewisii* have evolved several different pollination syndromes, including hummingbird pollination and self pollination (autogamy). We are interested in how floral scent variation contributed to species diversification in this clade.

We analyzed variation in E-Î²-ocimene emission within this *Mimulus* clade and explored its molecular basis through a combination of DNA sequencing, reverse transcriptase PCR, and enzyme functional analysis in vitro.

We found that none of the taxa, other than *M. lewisii*, emitted E-Î²-ocimene from flowers. But the molecular basis underlying loss of E-Î²-ocimene emission is unique in each taxon, including deletion, missense, or frameshift mutations in the OS gene, and potential posttranscriptional downregulation.

The molecular evidence suggests that parallel loss-of-function in OS is the best explanation for the observed pattern of E-Î²-ocimene emission, likely as the result of natural selection.

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Presumptive Null

Molecular Type

Aberration Type

Insertion Size

Molecular Details of the Mutation

Experimental Evidence

Main Reference

Authors

Abstract

Additional References

RELATED GEPHE

1 (LIMONENE-MYRCENE SYNTHASE (LMS)) (<https://www.gephebase.org/search-criteria?/or+Taxon+ID=~69919^/and+Trait=+Fragrance/or+Taxon+ID=~188297^/and+Trait=+Fragrance/and+groupHaplotypes=true#gephebase-summary-title>)

2 ([https://www.gephebase.org/search-criteria?/or+Gene+Gephebase=~OCYMENE+SYNTHASE+\(OS\)^/and+Taxon+ID=~69919^/or+Gene+Gephebase=~OCYMENE+SYNTHASE+\(OS\)^/and+Taxon+ID=~188297^#gephebase-summary-title](https://www.gephebase.org/search-criteria?/or+Gene+Gephebase=~OCYMENE+SYNTHASE+(OS)^/and+Taxon+ID=~69919^/or+Gene+Gephebase=~OCYMENE+SYNTHASE+(OS)^/and+Taxon+ID=~188297^#gephebase-summary-title))

Related Genes

Related Haplotypes

EXTERNAL LINKS

COMMENTS