GEPHE SUMMARY

Gephebase Gene

benzoyl-CoA:benzylalcohol/2-phenylethanol benzoyltransferase (BPBT) (https://www.gephebase.org/search-criteria?/and+Gene Gephebase=^benzoyl-CoA:benzylalcohol/2-phenylethanol benzoyltransferase (BPBT)^#gephebase-summary-title)

Entry Status

Published

GepheID

GP00001765

Main curator

Courtier

PHENOTYPIC CHANGE

Trait Category

Physiology (https://www.gephebase.org/search-criteria?/and+Trait Category=^Physiology^#gephebase-summary-title)

Trait

Fragrance (https://www.gephebase.org/search-criteria?/and+Trait=^Fragrance^#gephebase-summary-title)

Trait State in Taxon A

Petunia inflata (less odorant; bee polinated)

Trait State in Taxon B

Petunia axillaris (very odorant; increase of phenylpropanoids and benzenoids; hawkmoth polinated)

Ancestral State

Taxon A

Taxonomic Status

Interspecific (https://www.gephebase.org/search-criteria?/and+Taxonomic Status=^Interspecific^#gephebase-summary-title)

Taxon A

Latin Name

Petunia integrifolia subsp. inflata (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=^Petunia integrifolia subsp. inflata^#gephebase-summary-title)

Common Name

-

Synonyms

Petunia inflata; Petunia inflata R.E.Fr., 1911; Petunia integrifolia subsp. inflata (R.E.Fr.) Wijsman, 1982

Rank

subspecies

Lineage

cellular organisms; Eukaryota; Viridiplantae; Streptophyta; Streptophytina; Embryophyta; Tracheophyta; Euphyllophyta; Spermatophyta; Magnoliophyta; Mesangiospermae; eudicotyledons; Gunneridae; Pentapetalae; asterids; lamiids; Solanales; Solanaceae; Petunioideae; Petunia; Petunia integrifolia

Parent

Petunia integrifolia () - (Rank: species) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 4103)

NCBI Taxonomy ID

212142 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 212142)

is Taxon A an Infraspecies?

No

Taxon B

Latin Name

Petunia axillaris (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=^Petunia axillaris^#gephebase-summary-title)

Common Name

-

Synonyms

large white petunia; white moon petunia; Petunia axillaris (Lam.) Britton, Stern & Poggenb.; Petunia axilliaris

Rank

species

Lineage

cellular organisms; Eukaryota; Viridiplantae; Streptophyta; Streptophytina; Embryophyta; Tracheophyta; Euphyllophyta; Spermatophyta; Magnoliophyta; Mesangiospermae; eudicotyledons; Gunneridae; Pentapetalae; asterids; lamiids; Solanales; Solanaceae; Petunioideae; Petunia

Parent

Petunia () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 4101)

NCBI Taxonomy ID

33119 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 33119)

is Taxon B an Infraspecies?

No

GENOTYPIC CHANGE

Generic Gene Name

BPBT

Synonyms

-

String

-

Sequence Similarities

-

GO - Molecular Function

GO:0016747 : transferase activity, transferring acyl groups other than amino-acyl groups (https://www.ebi.ac.uk/QuickGO/term/GO:0016747)

GO - Biological Process

-

GO - Cellular Component

UniProtKB Populus davidiana

A0A172W606 (http://www.uniprot.org/uniprot/A0A172W606)

GenebankID or UniProtKB

()

-

Presumptive Null

No (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)

Aberration Type

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

Molecular Details of the Mutation

Allele-specific expression in hybrids - de novo expression in P. axillaris

Experimental Evidence

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

Main Reference

Gain and Loss of Floral Scent Production through Changes in Structural Genes during Pollinator-Mediated Speciation. (2016) (https://pubmed.ncbi.nlm.nih.gov/27916524)

Authors

Amrad A; Moser M; Mandel T; de Vries M; Schuurink RC; Freitas L; Kuhlemeier C

Abstract

The interactions of plants with their pollinators are thought to be a driving force in the evolution of angiosperms. Adaptation to a new pollinator involves coordinated changes in multiple floral traits controlled by multiple genes. Surprisingly, such complex genetic shifts have happened numerous times during evolution. Here we report on the genetic basis of the changes in one such trait, floral scent emission, in the genus Petunia (Solanaceae). The increase in the quantity and complexity of the volatiles during the shift from bee to hawkmoth pollination was due to de novo expression of the genesÂ encoding benzoic acid/salicylic acid carboxyl methyltransferase (BSMT) and benzoyl-CoA:benzylalcohol/2-phenylethanol benzoyltransferase (BPBT) together with moderately increased transcript levels for most enzymes of the phenylpropanoid/benzenoid pathway. Loss of cinnamate-CoA ligase (CNL) function as well as a reduction in the expression of the MYB transcription factor ODO1 explain the lossÂ of scent during the transition from moth to hummingbird pollination. The CNL gene in the hummingbird-adapted species is inactive due to a stop codon, but also appears to have undergone further degradation over time. Therefore, we propose that loss of scent happened relatively early inÂ the transition toward hummingbird pollination, and probably preceded the loss of UV-absorbing flavonols. The discovery that CNL is also involved in the loss of scent during the transition from outcrossing to selfing in Capsella (Brassicaceae) (see the accompanying paper) raises interesting questions about the possible causes of deep evolutionary conservation of the targets of evolutionary change.

Additional References

RELATED GEPHE

Related Genes

1 (benzoic acid/salicylic acid carboxyl methyltransferase (BSMT)) (https://www.gephebase.org/search-criteria?/or+Taxon ID=^212142^/and+Trait=Fragrance/or+Taxon ID=^33119^/and+Trait=Fragrance/and+groupHaplotypes=true#gephebase-summary-title)

Related Haplotypes

No matches found.

EXTERNAL LINKS

COMMENTS