

GEPHE SUMMARY

	Gephebase Gene	GephelD
benzoic acid/salicylic acid carboxyl methyltransferase (BSMT) (https://www.gephebase.org/search-criteria?/and+Gene Gephebase=%benzoic acid/salicylic acid carboxyl methyltransferase (BSMT)%#gephebase-summary-title)	GP00001766	Main curator
	Entry Status	
Published	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 pollinated)	Trait State in Taxon B	
Petunia axillaris (very odorant; increase of phenylpropanoids and benzenoids; hawkmoth pollinated)	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
Petunia integrifolia subsp. inflata (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=%Petunia integrifolia subsp. inflata%#gephebase-summary-title)	Petunia axillaris (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=%Petunia axillaris%#gephebase-summary-title)	
-	Common Name	Common Name
Petunia inflata; Petunia inflata R.E.Fr., 1911; Petunia integrifolia subsp. inflata (R.E.Fr.) Wijisman, 1982	Synonyms	Synonyms
	Rank	Rank
subspecies	Lineage	Lineage
cellular organisms; Eukaryota; Viridiplantae; Streptophyta; Streptophytina; Embryophyta; Tracheophyta; Euphylophyta; Spermatophyta; Magnoliophyta; Mesangiospermae; eudicotyledons; Gunneridae; Pentapetalae; asterids; lamiids; Solanales; Solanaceae; Petunioideae; Petunia; Petunia integrifolia		
Petunia integrifolia () - (Rank: species) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 4103)	Parent	Parent
212142 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 212142)	NCBI Taxonomy ID	NCBI Taxonomy ID
	is Taxon A an Infraspecies?	is Taxon B an Infraspecies?
No		

GENOTYPIC CHANGE

	Generic Gene Name	UniProtKB Arabidopsis thaliana
BSMT1	Synonyms	GenebankID or UniProtKB
ATBSMT1; At3g11480; F24K9.15	String	
3702.AT3G11480.1 (http://string-db.org/newstring_cgi/show_network_section.pl?identifier= 3702.AT3G11480.1)	Sequence Similarities	
Belongs to the methyltransferase superfamily. Type-7 methyltransferase family. SABATH subfamily.	GO - Molecular Function	
GO:0046872 : metal ion binding (https://www.ebi.ac.uk/QuickGO/term/GO:0046872)		
GO:0008757 : S-adenosylmethionine-dependent methyltransferase activity (https://www.ebi.ac.uk/QuickGO/term/GO:0008757)		

GO:0052624 : 2-phytyl-1,4-naphthoquinone methyltransferase activity

(<https://www.ebi.ac.uk/QuickGO/term/GO:0052624>)

GO:0080150 : S-adenosyl-L-methionine:benzoic acid carboxyl methyl transferase activity

(<https://www.ebi.ac.uk/QuickGO/term/GO:0080150>)

GO - Biological Process

GO:0006952 : defense response (<https://www.ebi.ac.uk/QuickGO/term/GO:0006952>)

GO:0009611 : response to wounding (<https://www.ebi.ac.uk/QuickGO/term/GO:0009611>)

GO:0051707 : response to other organism

(<https://www.ebi.ac.uk/QuickGO/term/GO:0051707>)

GO - Cellular Component

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

Presumptive Null

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

Molecular Type

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

Aberration Type

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

Molecular Details of the Mutation

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

Experimental Evidence

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

Main Reference

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

Authors

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 genes \hat{A} 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 loss \hat{A} 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 in \hat{A} 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.

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Additional References

RELATED GEPHE

Related Genes

1 (benzoyl-CoA:benzylalcohol/2-phenylethanol benzoyltransferase (BPBT)) (<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