

GEPHE SUMMARY

Gephebase Gene
Cinnamate-CoA ligase 1 (CNL1)
Entry Status
Published

GepheID
GP00001767
Main curator
Courtier

PHENOTYPIC CHANGE

Trait Category
Physiology

Trait
Fragrance

Trait State in Taxon A
Capsella grandiflora ; benzaldehyde is the major constituent of its floral scent

Trait State in Taxon B
Red Shepherd's Purse Capsella rubella ; no scent

Ancestral State
Taxon A

Taxonomic Status
Interspecific

	Taxon A		Taxon B
Latin Name	<i>Capsella grandiflora</i>	Latin Name	<i>Capsella rubella</i>
Common Name	-	Common Name	-
Synonyms	Capsella grandiflora (Fauche & Chaub.) Boiss.	Synonyms	Capsella rubella Reut.
Rank	species	Rank	species
Lineage	cellular organisms; Eukaryota; Viridiplantae; Streptophyta; Streptophytina; Embryophyta; Tracheophyta; Euphyllophyta; Spermatophyta; Magnoliophyta; Mesangiospermae; eudicotyledons; Gunneridae; Pentapetales; rosids; malvids; Brassicales; Brassicaceae; Camelineae; Capsella	Lineage	cellular organisms; Eukaryota; Viridiplantae; Streptophyta; Streptophytina; Embryophyta; Tracheophyta; Euphyllophyta; Spermatophyta; Magnoliophyta; Mesangiospermae; eudicotyledons; Gunneridae; Pentapetales; rosids; malvids; Brassicales; Brassicaceae; Camelineae; Capsella
Parent	Capsella () - (Rank: genus)	Parent	Capsella () - (Rank: genus)
NCBI Taxonomy ID	264402	NCBI Taxonomy ID	81985
is Taxon A an Intraspecies?	No	is Taxon B an Intraspecies?	No

GENOTYPIC CHANGE

Generic Gene Name
CNL
Synonyms
-
String
-
Sequence Similarities
-
GO - Molecular Function
GO:0016874 : ligase activity
GO - Biological Process
-
GO - Cellular Component
-

Presumptive Null
Yes

Molecular Type

UniProtKB Populus davidiana
A0A172W603
GenebankID or UniProtKB

Coding

Aberration Type
SNP

SNP Coding Change
Nonsynonymous

Molecular Details of the Mutation

serine-to-arginine exchange at position 453 (T-to-A nucleotide exchange at genomic position 7 539 424) - this mutation is located immediately next to highly conserved amino acids predicted to be involved in adenosine monophosphate and coenzyme A binding; it involves two biochemically very dissimilar amino acids; and the serine at this position is conserved

Experimental Evidence
Linkage Mapping

	Taxon A	Taxon B	Position
Codon	-	-	7539424
Amino-acid	Ser	Arg	453

Main Reference

Repeated Inactivation of the First Committed Enzyme Underlies the Loss of Benzaldehyde Emission after the Selfing Transition in *Capsella*. (2016)

Authors

Sas C; MÃ¼ller F; Kappel C; Kent TV; Wright SI; Hilker M; Lenhard M

Abstract

The enormous species richness of flowering plants is at least partly due to floral diversification driven by interactions between plants and their animal pollinators [1, 2]. Specific pollinator attraction relies on visual and olfactory floral cues [3-5]; floral scent can not only attract pollinators but also attract or repel herbivorous insects [6-8]. However, despite its central role for plant-animal interactions, the genetic control of floral scent production and its evolutionary modification remain incompletely understood [9-13]. Benzenoids are an important class of floral scent compounds that are generated from phenylalanine via several enzymatic pathways [14-17]. Here we address the genetic basis of the loss of floral scent associated with the transition from outbreeding to selfing in the genus *Capsella*. While the outbreeding *C. grandiflora* emits benzaldehyde as a major constituent of its floral scent, this has been lost in the selfing *C. rubella*. We identify the *Capsella* CNL1 gene encoding cinnamate:CoA ligase as responsible for this variation. Population genetic analysis indicates that CNL1 has been inactivated twice independently in *C. rubella* via different novel mutations to its coding sequence. Together with a recent study in *Petunia* [18], this identifies cinnamate:CoA ligase as an evolutionary hotspot for mutations causing the loss of benzenoid scent compounds in association with a shift in the reproductive strategy of *Capsella* from pollination by insects to self-fertilization.

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[Additional References](#)

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No matches found.

Related Haplotypes

1

EXTERNAL LINKS

COMMENTS

And also @Introgression of the *C. rubella*-like haplotype back into *C. grandiflora*