GEPHE SUMMARY

Gephebase Gene
CYP(T) (https://www.gephebase.org/search-criteria?/and+Gene Gephebase=^CYP(T)^#gephebase-summary-title)

GepheID
GP00001395

Entry Status
Published

Main curator
Prigent

PHENOTYPIC CHANGE

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

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

Trait State in Taxon A
Primula vulgaris

Trait State in Taxon B
Primula vulgaris

Ancestral State
Taxon A

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

Taxon A

Latin Name
Primula vulgaris (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=^Primula vulgaris^#gephebase-summary-title)

Common Name
-

Synonyms
Primula acaulis; Primula acaulis (L.) Hill; Primula vulgaris Huds.

Rank
species

Lineage
cellular organisms; Eukaryota; Viridiplantae; Streptophyta; Streptophytina; Embryophyta; Tracheophyta; Euphyllophyta; Spermatophyta; Magnoliophyta; Mesangiospermae; eudicotyledons; Gunneridae; Pentapetalae; asterids; Ericales; Primulaceae; Primula

Parent
Primula (primroses) - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 49647)

NCBI Taxonomy ID
175104 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 175104)

is Taxon A an Infraspecies?
No

Taxon B

Latin Name
Primula vulgaris (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=^Primula vulgaris^#gephebase-summary-title)

Common Name
-

Synonyms
Primula acaulis; Primula acaulis (L.) Hill; Primula vulgaris Huds.

Rank
species

Lineage
cellular organisms; Eukaryota; Viridiplantae; Streptophyta; Streptophytina; Embryophyta; Tracheophyta; Euphyllophyta; Spermatophyta; Magnoliophyta; Mesangiospermae; eudicotyledons; Gunneridae; Pentapetalae; asterids; Ericales; Primulaceae; Primula

Parent
Primula (primroses) - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 49647)

NCBI Taxonomy ID
175104 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 175104)

is Taxon B an Infraspecies?
No

GENOTYPIC CHANGE

Generic Gene Name
CYP734A1

Synonyms
CYP72B1; CYP734A1; F18A8.8; F18A8_8; PHYB ACTIVATION TAGGED SUPPRESSOR 1; BAS1; At2g26710

String
3702.AT2G26710.1 (http://string-db.org/newstring_cgi/show_network_section.pl?identifier= 3702.AT2G26710.1)

Sequence Similarities
Belongs to the cytochrome P450 family.

GO - Molecular Function
GO:0020037 : heme binding (https://www.ebi.ac.uk/QuickGO/term/GO:0020037)
GO:0005506 : iron ion binding (https://www.ebi.ac.uk/QuickGO/term/GO:0005506)
GO:0004497 : monooxygenase activity (https://www.ebi.ac.uk/QuickGO/term/GO:0004497)
GO:0016705 : oxidoreductase activity, acting on paired donors, with incorporation or reduction of molecular oxygen (https://www.ebi.ac.uk/QuickGO/term/GO:0016705)
GO:0008395 : steroid hydroxylase activity

UniProtKB Arabidopsis thaliana
O48786 (http://www.uniprot.org/uniprot/O48786)

GenebankID or UniProtKB
()

(https://www.ebi.ac.uk/QuickGO/term/GO:0008395)

GO - Biological Process

GO:0040008 : regulation of growth (https://www.ebi.ac.uk/QuickGO/term/GO:0040008)
GO:0010268 : brassinosteroid homeostasis
(https://www.ebi.ac.uk/QuickGO/term/GO:0010268)
GO:0016131 : brassinosteroid metabolic process
(https://www.ebi.ac.uk/QuickGO/term/GO:0016131)
GO:0009741 : response to brassinosteroid
(https://www.ebi.ac.uk/QuickGO/term/GO:0009741)

GO - Cellular Component

GO:0016021 : integral component of membrane
(https://www.ebi.ac.uk/QuickGO/term/GO:0016021)

Presumptive Null

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

Nonsynonymous

Molecular Details of the Mutation

G>C p.Asp126His in exon 2

Experimental Evidence

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

	Taxon A	Taxon B	Position
Codon	-	-	-
Amino-acid	-	-	-

Main Reference

Genetic architecture and evolution of the S locus supergene in Primula vulgaris. (2016) (https://pubmed.ncbi.nlm.nih.gov/27909301)

Authors

Li J; Cocker JM; Wright J; Webster MA; McMullan M; Dyer S; Swarbreck D; Caccamo M; Oosterhout CV; Gilmartin PM

Abstract

Darwin's studies on heterostyly in Primula described two floral morphs, pin and thrum, with reciprocal anther and stigma heights that promote insect-mediated cross-pollination. This key innovation evolved independently in several angiosperm families. Subsequent studies on heterostyly in Primula contributed to the foundation of modern genetic theory and the neo-Darwinian synthesis. The established genetic model for Primula heterostyly involves a diallelic S locus comprising several genes, with rare recombination events that result in self-fertile homostyle flowers with anthers and stigma at the same height. Here we reveal the S locus supergene as a tightly linked cluster of thrum-specific genes that are absent in pins. We show that thrums are hemizygous not heterozygous for the S locus, which suggests that homostyles do not arise by recombination between S locus haplotypes as previously proposed. Duplication of a floral homeotic gene 51.7 million years (Myr) ago, followed by its neofunctionalization, created the current S locus assemblage which led to floral heteromorphy in Primula. Our findings provide new insights into the structure, function and evolution of this archetypal supergene.

Additional References

RELATED GEPHE

Related Genes

2 (GLO(T), S locus supergene (GLO/CFB Cluster)) (https://www.gephebase.org/search-criteria?/or+Taxon ID=^175104^/and+Trait=Flower morphology/and+groupHaplotypes=true#gephebase-summary-title)

Related Haplotypes

1 (https://www.gephebase.org/search-criteria?/or+Gene Gephebase=^CYP(T)^/and+Taxon ID=^175104^/or+Gene Gephebase=^CYP(T)^/and+Taxon ID=^175104^#gephebase-summary-title)

EXTERNAL LINKS

COMMENTS

long homostyle are homozygous for the supergene S