GEPHE SUMMARY

Gephebase Gene

flavonoid 3′-hydroxylase (F3′H) (https://www.gephebase.org/search-criteria?/and+Gene Gephebase=^flavonoid 3′-hydroxylase (F3′H)^#gephebase-summary-title)

GepheID

GP00000319

Entry Status

Published

Main curator

Martin

PHENOTYPIC CHANGE

Trait Category

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

Trait

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

Trait State in Taxon A

Ipomoea purpurea - dark purple flowers

Trait State in Taxon B

Ipomoea purpurea - pink mutant - stable reddish flowers

Ancestral State

Taxon A

Taxonomic Status

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

Taxon A

Latin Name

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

Common Name

common morning-glory

Synonyms

Convolvulus purpureus; Pharbitis purpurea; common morning-glory; Convolvulus purpureus L., 1762; Ipomoea purpurea (L.) Roth, 1787; Pharbitis purpurea (L.) Voigt, 1845; Pharbits purpurea

Rank

species

Lineage

cellular organisms; Eukaryota; Viridiplantae; Streptophyta; Streptophytina; Embryophyta; Tracheophyta; Euphyllophyta; Spermatophyta; Magnoliophyta; Mesangiospermae; eudicotyledons; Gunneridae; Pentapetalae; asterids; lamiids; Solanales; Convolvulaceae; Ipomoeeae; Ipomoea

Parent

Ipomoea () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 4119)

NCBI Taxonomy ID

4121 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 4121)

is Taxon A an Infraspecies?

No

Taxon B

Latin Name

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

Common Name

common morning-glory

Synonyms

Convolvulus purpureus; Pharbitis purpurea; common morning-glory; Convolvulus purpureus L., 1762; Ipomoea purpurea (L.) Roth, 1787; Pharbitis purpurea (L.) Voigt, 1845; Pharbits purpurea

Rank

species

Lineage

cellular organisms; Eukaryota; Viridiplantae; Streptophyta; Streptophytina; Embryophyta; Tracheophyta; Euphyllophyta; Spermatophyta; Magnoliophyta; Mesangiospermae; eudicotyledons; Gunneridae; Pentapetalae; asterids; lamiids; Solanales; Convolvulaceae; Ipomoeeae; Ipomoea

Parent

Ipomoea () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 4119)

NCBI Taxonomy ID

4121 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 4121)

is Taxon B an Infraspecies?

No

GENOTYPIC CHANGE

Generic Gene Name

CYP75B1

Synonyms

CYP75B1; CYTOCHROME P450 75B1; D501; F13G24.190; F13G24_190; F3′H; FLAVONOID 3′-HYDROXYLASE; TRANSPARENT TESTA 7; TT7; At5g07990

String

3702.AT5G07990.1 (http://string-db.org/newstring_cgi/show_network_section.pl?identifier= 3702.AT5G07990.1)

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:0016709 : oxidoreductase activity, acting on paired donors, with incorporation or reduction of molecular oxygen, NAD(P)H as one donor, and incorporation of one atom of

UniProtKB Arabidopsis thaliana

Q9SD85 (http://www.uniprot.org/uniprot/Q9SD85)

GenebankID or UniProtKB

AAS46257 (https://www.ncbi.nlm.nih.gov/nuccore/AAS46257)

oxygen (https://www.ebi.ac.uk/QuickGO/term/GO:0016709)

GO - Biological Process

GO:0009733 : response to auxin (https://www.ebi.ac.uk/QuickGO/term/GO:0009733)
GO:0009813 : flavonoid biosynthetic process
(https://www.ebi.ac.uk/QuickGO/term/GO:0009813)

GO - Cellular Component

GO:0016021 : integral component of membrane
(https://www.ebi.ac.uk/QuickGO/term/GO:0016021)
GO:0016020 : membrane (https://www.ebi.ac.uk/QuickGO/term/GO:0016020)
GO:0005789 : endoplasmic reticulum membrane
(https://www.ebi.ac.uk/QuickGO/term/GO:0005789)

Presumptive Null

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

Molecular Type

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

Aberration Type

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

Insertion Size

-

Molecular Details of the Mutation

insertion of the 0.55-kb DNA transposable element Tip201 belonging to the Ac/Ds superfamily. No excision of Tip201 from the F3′H gene could be detected. Both splicing and polyadenylation patterns of the F3′H transcripts were affected by the Tip201 integration.

Experimental Evidence

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

Main Reference

The genetic basis of a flower color polymorphism in the common morning glory (Ipomoea purpurea). (2003 Nov-Dec) (https://pubmed.ncbi.nlm.nih.gov/14691310)

Authors

Zufall RA; Rausher MD

Abstract

The common morning glory (Ipomoea purpurea) is highly polymorphic for flower color. Part of this phenotypic variation is due to allelic variation at the P locus. This locus determines whether flowers will be purple or pink, where purple is dominant to pink. We have determined that the anthocyanin biosynthetic gene flavonoid 3′-hydroxylase (f3′h) corresponds to the P locus. In the pink allele of f3′h there is a large insertion in the third exon, which results in the production of a truncated transcript. This shortened transcript produces a nonfunctional F3′H enzyme, resulting in the production of pink flowers rather than purple. In addition, we describe a polymerase chain reaction (PCR)-based assay that can be used to determine the genotype of a plant at this locus.

Additional References

Spontaneous mutations of the flavonoid 3′-hydroxylase gene conferring reddish flowers in the three morning glory species. (2003) (https://pubmed.ncbi.nlm.nih.gov/14581624)
Genetic changes associated with floral adaptation restrict future evolutionary potential. (2004) (https://pubmed.ncbi.nlm.nih.gov/15103375)
Parallel evolution at multiple levels in the origin of hummingbird pollinated flowers in Ipomoea. (2010) (https://pubmed.ncbi.nlm.nih.gov/20148948)

RELATED GEPHE

Related Genes

3 (bHLH2, Chalcone synthase D (CHS-D), MYB1) (https://www.gephebase.org/search-criteria?/or+Taxon ID=^4121^/and+Trait=Coloration/and+groupHaplotypes=true#gephebase-summary-title)

Related Haplotypes

No matches found.

EXTERNAL LINKS

COMMENTS

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