

GEPHE SUMMARY

bHLH2 (https://www.gephebase.org/search-criteria?/and+GeneGephebase=bHLH2#gephebase-summary-title)	Gephebase Gene	GP00002091	GepheID
Published	Entry Status	Courtier	Main curator

PHENOTYPIC CHANGE

Morphology (https://www.gephebase.org/search-criteria?/and+TraitCategory=Morphology#gephebase-summary-title)	Trait Category		
Coloration (flowers; seeds) (https://www.gephebase.org/search-criteria?/and+Trait=Coloration(flowers;seeds)#gephebase-summary-title)	Trait		
Ipomoea tricolor - bright blue flowers and dark-brown seeds	Trait State in Taxon A		
Ipomoea tricolor - pale blue flowers with a few fine blue spots and ivory seeds with tiny dark brown spots	Trait State in Taxon B		
	Ancestral State		
Taxon A		Taxon B	
Domesticated (https://www.gephebase.org/search-criteria?/and+TaxonomicStatus=Domesticated#gephebase-summary-title)	Taxonomic Status		
	Latin Name		Latin Name
Ipomoea tricolor (https://www.gephebase.org/search-criteria?/and+TaxonandSynonyms=Ipomoeatricolor#gephebase-summary-title)		Ipomoea tricolor (https://www.gephebase.org/search-criteria?/and+TaxonandSynonyms=Ipomoeatricolor#gephebase-summary-title)	
-	Common Name	-	Common Name
	Synonyms		Synonyms
Ipomoea rubro-caerulea; Ipomoea rubrocaerulea; Pharbitis rubro-caerulea; Pharbitis rubrocaeruleus; campanilla; flying-saucers; pearly-gates; yaxcelil; Ipomoea rubrocaerulea Hook., 1834; Ipomoea tricolor Cav., 1795; Pharbitis rubrocaeruleus (Hook.) Planch., 1854		Ipomoea rubro-caerulea; Ipomoea rubrocaerulea; Pharbitis rubro-caerulea; Pharbitis rubrocaeruleus; campanilla; flying-saucers; pearly-gates; yaxcelil; Ipomoea rubrocaerulea Hook., 1834; Ipomoea tricolor Cav., 1795; Pharbitis rubrocaeruleus (Hook.) Planch., 1854	
species	Rank	species	Rank
	Lineage		Lineage
cellular organisms; Eukaryota; Viridiplantae; Streptophyta; Streptophytina; Embryophyta; Tracheophyta; Euphyllophyta; Spermatophyta; Magnoliopsida; Mesangiospermae; eudicotyledons; Gunneridae; Pentapetalae; asterids; lamiids; Solanales; Convolvulaceae; Ipomoeae; Ipomoea		cellular organisms; Eukaryota; Viridiplantae; Streptophyta; Streptophytina; Embryophyta; Tracheophyta; Euphyllophyta; Spermatophyta; Magnoliopsida; Mesangiospermae; eudicotyledons; Gunneridae; Pentapetalae; asterids; lamiids; Solanales; Convolvulaceae; Ipomoeae; Ipomoea	
	Parent		Parent
Ipomoea () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=4119)	NCBI Taxonomy ID	Ipomoea () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=4119)	NCBI Taxonomy ID
89664 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=89664)		89664 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=89664)	
No	is Taxon A an Intraspecies?	No	is Taxon B an Intraspecies?

GENOTYPIC CHANGE

BHLH2	Generic Gene Name	Q9CAD0 (http://www.uniprot.org/uniprot/Q9CAD0)	UniProtKB Arabidopsis thaliana
AtEGL3; ATMYC-2; EGL1; ENHANCER OF GLABRA 3; F24D7.16; F24D7_16; EGL3; EN30; MYC146; At1g63650	Synonyms	()	GenebankID or UniProtKB
3702.AT1G63650.3 (http://string-db.org/newstring.cgi/show_network_section.pl?identifier=3702.AT1G63650.3)	String		
	Sequence Similarities		
-			
GO:0046983 : protein dimerization activity (https://www.ebi.ac.uk/QuickGO/term/GO:0046983)	GO - Molecular Function		
GO:0003700 : DNA-binding transcription factor activity			

(<https://www.ebi.ac.uk/QuickGO/term/GO:0003700>)
GO:0003677 : DNA binding (<https://www.ebi.ac.uk/QuickGO/term/GO:0003677>)
GO - Biological Process

GO:0007275 : multicellular organism development
(<https://www.ebi.ac.uk/QuickGO/term/GO:0007275>)
GO:0006355 : regulation of transcription, DNA-templated
(<https://www.ebi.ac.uk/QuickGO/term/GO:0006355>)
GO:0009867 : jasmonic acid mediated signaling pathway
(<https://www.ebi.ac.uk/QuickGO/term/GO:0009867>)
GO:0009957 : epidermal cell fate specification
(<https://www.ebi.ac.uk/QuickGO/term/GO:0009957>)
GO:0010026 : trichome differentiation
(<https://www.ebi.ac.uk/QuickGO/term/GO:0010026>)

GO - Cellular Component

GO:0005634 : nucleus (<https://www.ebi.ac.uk/QuickGO/term/GO:0005634>)

Presumptive Null

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

Molecular Type

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

Aberration Type

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

Insertion Size

1-10 kb

Molecular Details of the Mutation

intragenic tandem duplication of 3.3 kbp of the bHLH2 gene. Each of the tandem repeats is flanked by a 3-bp sequence AAT; indicating that the 3-bp microhomology is used to generate the tandem duplication. The transcripts in the pale-blue flower buds of the mutant contain an internal 583-bp tandem duplication that results in the production of a truncated polypeptide lacking the bHLH domain. The mRNA accumulation of most of the structural genes encoding enzymes for anthocyanin biosynthesis in the flower buds of the mutant was significantly reduced. The transcripts identical to the wild-type mRNAs for the transcriptional activator were present abundantly in blue spots of the variegated flowers whereas the transcripts containing the 583-bp tandem duplication were predominant in the pale-blue background of the same flowers. The flower and seed variegations studied here are likely to be caused by somatic homologous recombination between an intragenic tandem duplication in the gene encoding a bHLH transcriptional activator for anthocyanin biosynthesis.

Experimental Evidence

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

Main Reference

An intragenic tandem duplication in a transcriptional regulatory gene for anthocyanin biosynthesis confers pale-colored flowers and seeds with fine spots in *Ipomoea tricolor*. (2004)
(<https://pubmed.ncbi.nlm.nih.gov/15144384>)

Authors

Park KI; Choi JD; Hoshino A; Morita Y; Iida S

Abstract

While the wild-type morning glory (*Ipomoea tricolor*) displays bright-blue flowers and dark-brown seeds, its spontaneous mutant, Blue Star, carrying the mutable ivory seed-variegated (*ivs-v*) allele, exhibits pale-blue flowers with a few fine blue spots and ivory seeds with tiny dark-brown spots. The mutable allele is caused by an intragenic tandem duplication of 3.3 kbp within a gene for transcriptional activator containing a basic helix-loop-helix (bHLH) DNA-binding motif. Each of the tandem repeats is flanked by a 3-bp sequence AAT, indicating that the 3-bp microhomology is used to generate the tandem duplication. The transcripts in the pale-blue flower buds of the mutant contain an internal 583-bp tandem duplication that results in the production of a truncated polypeptide lacking the bHLH domain. The mRNA accumulation of most of the structural genes encoding enzymes for anthocyanin biosynthesis in the flower buds of the mutant was significantly reduced. The transcripts identical to the wild-type mRNAs for the transcriptional activator were present abundantly in blue spots of the variegated flowers, whereas the transcripts containing the 583-bp tandem duplication were predominant in the pale-blue background of the same flowers. The flower and seed variegations studied here are likely to be caused by somatic homologous recombination between an intragenic tandem duplication in the gene encoding a bHLH transcriptional activator for anthocyanin biosynthesis, whereas various flower variegations are reported to be caused by excision of DNA transposons inserted into pigmentation genes.

Additional References

RELATED GEPHE

Related Genes

1 (flavonoid 3'-hydroxylase (F3'H)) ([https://www.gephebase.org/search-criteria?/or+Taxon ID="+89664"/and+Trait=Coloration/and+groupHaplotypes=true#gephebase-summary-title](https://www.gephebase.org/search-criteria?/or+Taxon+ID=))

Related Haplotypes

No matches found.

EXTERNAL LINKS

COMMENTS

