

GEPHE SUMMARY

Ruby (#https://www.gephebase.org/search-criteria?/and+Gene+Gephebase+Ruby)	Gephebase Gene	GP00001018	GepheID
Published	Entry Status	Martin	Main curator

PHENOTYPIC CHANGE

Morphology (#https://www.gephebase.org/search-criteria?/and+Trait+Category+Morphology)	Trait Category		
Coloration (fruit; cold-dependent) (#https://www.gephebase.org/search-criteria?/and+Trait+Coloration+fruit+cold-dependent)	Trait		
Citrus spp. - blond	Trait State in Taxon A		
Citrus sinensis - Sicilian blood oranges	Trait State in Taxon B		
Taxon A	Ancestral State		
Domesticated (#https://www.gephebase.org/search-criteria?/and+Taxonomic+Status+Domesticated)	Taxonomic Status		
	Taxon A		Taxon B
	Latin Name		Latin Name
Citrus (#https://www.gephebase.org/search-criteria?/and+Taxon+Synonyms+Citrus)	Common Name	Citrus sinensis (#https://www.gephebase.org/search-criteria?/and+Taxon+Synonyms+Citrus+sinensis)	Common Name
-	Synonyms	sweet orange	Synonyms
Citrus L., 1753; Eremocitrus Swingle; Fortunella Swingle; Microcitrus Swingle	Rank	Citrus x sinensis; sweet orange; Valencia orange; apfelsine; naranja; navel orange; Citrus sinensis (L.) Osbeck; Citrus sinensis	Rank
genus	Lineage	species	Lineage
cellular organisms; Eukaryota; Viridiplantae; Streptophyta; Streptophytina; Embryophyta; Tracheophyta; Euphyllophyta; Spermatophyta; Magnoliophyta; Mesangiospermae; eudicotyledons; Gunneridae; Pentapetalae; rosids; malvids; Sapindales; Rutaceae; Aurantioideae	Parent	cellular organisms; Eukaryota; Viridiplantae; Streptophyta; Streptophytina; Embryophyta; Tracheophyta; Euphyllophyta; Spermatophyta; Magnoliophyta; Mesangiospermae; eudicotyledons; Gunneridae; Pentapetalae; rosids; malvids; Sapindales; Rutaceae; Aurantioideae; Citrus	Parent
Aurantioideae () - (Rank: subfamily) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=1728959)	NCBI Taxonomy ID	Citrus () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=2706)	NCBI Taxonomy ID
2706 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=2706)	is Taxon A an Intraspecies?	2711 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=2711)	is Taxon B an Intraspecies?
Yes	Taxon A Description	Yes	Taxon B Description
Citrus spp. - blond		Citrus sinensis - Sicilian blood oranges - varieties Moro (Reeds); Tarocco; Maltaise Sanguine; Doppio Sanguigno and Sanguinelli	

GENOTYPIC CHANGE

Ruby	Generic Gene Name	H6U1F1 (http://www.uniprot.org/uniprot/H6U1F1)	UniProtKB Citrus sinensis
-	Synonyms	JN402330 (https://www.ncbi.nlm.nih.gov/nucleotide/JN402330)	GenebankID or UniProtKB
-	String		
-	Sequence Similarities		
-	GO - Molecular Function		
GO:0003677 : DNA binding (https://www.ebi.ac.uk/QuickGO/term/GO:0003677)	GO - Biological Process		
-	GO - Cellular Component		
GO:0005634 : nucleus (https://www.ebi.ac.uk/QuickGO/term/GO:0005634)			

No ([https://www.gephebase.org/search-criteria?/and+Presumptive Null="+No+"#gephebase-summary-title](https://www.gephebase.org/search-criteria?/and+Presumptive+Null=))

Presumptive Null

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

Molecular Type

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

Aberration Type

1-10 kb

Insertion Size

TE (Tc1) insertion triggering cold-dependent expression

Molecular Details of the Mutation

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=))

Experimental Evidence

Retrotransposons control fruit-specific, cold-dependent accumulation of anthocyanins in blood oranges. (2012) (<https://pubmed.ncbi.nlm.nih.gov/22427337>)

Main Reference

Butelli E; Licciardello C; Zhang Y; Liu J; Mackay S; Bailey P; Reforgiato-Recupero G; Martin C

Authors

Traditionally, Sicilian blood oranges (*Citrus sinensis*) have been associated with cardiovascular health, and consumption has been shown to prevent obesity in mice fed a high-fat diet. Despite increasing consumer interest in these health-promoting attributes, production of blood oranges remains unreliable due largely to a dependency on cold for full color formation. We show that Sicilian blood orange arose by insertion of a Copia-like retrotransposon adjacent to a gene encoding Ruby, a MYB transcriptional activator of anthocyanin production. The retrotransposon controls Ruby expression, and cold dependency reflects the induction of the retroelement by stress. A blood orange of Chinese origin results from an independent insertion of a similar retrotransposon, and color formation in its fruit is also cold dependent. Our results suggest that transposition and recombination of retroelements are likely important sources of variation in *Citrus*.

Abstract

Additional References

RELATED GEPHE

No matches found.

Related Genes

2 ([https://www.gephebase.org/search-criteria?/or+Gene Gephebase="+Ruby"/and+Taxon ID="+2706"/or+Gene Gephebase="+Ruby"/and+Taxon ID="+2711"#gephebase-summary-title](https://www.gephebase.org/search-criteria?/or+Gene+Gephebase=))

Related Haplotypes

EXTERNAL LINKS

COMMENTS

@TE