

GEPHE SUMMARY

	Gephebase Gene		GepheID
UGT86 (Bm-UGT10286) (https://www.gephebase.org/search-criteria?/and+Gene Gephebase="UGT86 (Bm-UGT10286)"#gephebase-summary-title)		GP00001160	
	Entry Status	Martin	Main curator
Published			

PHENOTYPIC CHANGE

	Trait Category		
Physiology (https://www.gephebase.org/search-criteria?/and+Trait Category="Physiology"#gephebase-summary-title)			
	Trait		
Coloration (cocoon) (<a coloration"="" href="https://www.gephebase.org/search-criteria?/and+Trait=">https://www.gephebase.org/search-criteria?/and+Trait="Coloration (cocoon)"#gephebase-summary-title)			
	Trait State in Taxon A		
Bombyx mandarina and Bombyx mori - green cocoon			
	Trait State in Taxon B		
Bombyx mori - white cocoon			
	Ancestral State		
Taxon A			
	Taxonomic Status		
Domesticated (https://www.gephebase.org/search-criteria?/and+Taxonomic Status="Domesticated"#gephebase-summary-title)			

Taxon A	Latin Name	Taxon B	Latin Name
Bombyx (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms="Bombyx"#gephebase-summary-title)		Bombyx mori (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms="Bombyx mori"#gephebase-summary-title)	
-	Common Name	-	Common Name
	domestic silkworm		
-	Synonyms	-	Synonyms
	domestic silkworm; silk moth; silkworm; Bombyx mori Linnaeus, 1758		
genus	Rank	-	Rank
	species		
	Lineage		Lineage
cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Protostomia; Ecdysozoa; Panarthropoda; Arthropoda; Mandibulata; Pancrustacea; Hexapoda; Insecta; Dicondylia; Pterygota; Neoptera; Holometabola; Amphiesmenoptera; Lepidoptera; Glossata; Neolepidoptera; Heteroneura; Ditrysia; Obtectomera; Bombycoidea; Bombycidae; Bombycinae		cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Protostomia; Ecdysozoa; Panarthropoda; Arthropoda; Mandibulata; Pancrustacea; Hexapoda; Insecta; Dicondylia; Pterygota; Neoptera; Holometabola; Amphiesmenoptera; Lepidoptera; Glossata; Neolepidoptera; Heteroneura; Ditrysia; Obtectomera; Bombycoidea; Bombycidae; Bombycinae; Bombyx	
	Parent		Parent
Bombycinae () - (Rank: subfamily) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=475327)		Bombyx () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=7090)	
	NCBI Taxonomy ID		NCBI Taxonomy ID
7090 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=7090)		7091 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=7091)	
	is Taxon A an Intraspecies?		is Taxon B an Intraspecies?
No		No	

GENOTYPIC CHANGE

	Generic Gene Name		
Bm-UGT10286		D6RUU6 (http://www.uniprot.org/uniprot/D6RUU6)	UniProtKB Bombyx mori
	Synonyms		GenebankID or UniProtKB
UGT40K1		AB539963 (https://www.ncbi.nlm.nih.gov/nucleotide/AB539963)	
-	String		
	Sequence Similarities		
Belongs to the UDP-glycosyltransferase family.			
	GO - Molecular Function		
GO:0015020 : glucuronosyltransferase activity (https://www.ebi.ac.uk/QuickGO/term/GO:0015020)			
	GO - Biological Process		
-			
	GO - Cellular Component		
GO:0016021 : integral component of membrane (https://www.ebi.ac.uk/QuickGO/term/GO:0016021)			

Presumptive Null

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

Molecular Type

Gene Loss ([#gpebase-summary-title](https://www.gephebase.org/search-criteria?/and+Molecular Type=^Gene Loss^))

Aberration Type

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

Deletion Size

10-100 kb

Molecular Details of the Mutation

38kb gene deletion

Experimental Evidence

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

Main Reference

The silkworm Green b locus encodes a quercetin 5-O-glucosyltransferase that produces green cocoons with UV-shielding properties. (2010) (<https://pubmed.ncbi.nlm.nih.gov/20534444>)

Authors

Daimon T; Hirayama C; Kanai M; Ruike Y; Meng Y; Kosegawa E; Nakamura M; Tsujimoto G; Katsuma S; Shimada T

Abstract

In the silkworm *Bombyx mori*, dietary flavonoids are metabolized and accumulate in cocoons, thereby causing green coloration. Classical genetic studies suggest that more than seven independent loci are associated with this trait; however, because of the complex inheritance pattern, none of these loci have been characterized molecularly, and a plausible and comprehensive model for their action has not been proposed. Here, we report the identification of the gene responsible for the Green b (Gb) locus involving the green cocoon trait. In +(Gb) animals, glucosylation at the 5-O position of dietary quercetin did not occur, and the total amount of flavonoids in tissues and cocoons was dramatically reduced. We performed positional cloning of Gb and found a 38-kb deletion in a UDP-glucosyltransferase (UGT) gene cluster associated with the +(Gb) allele. RT-PCR and biochemical studies suggested that deletion of Bm-UGT10286 (UGT) is responsible for Gb and Bm-UGT10286 is virtually the sole source of UGT activity toward the 5-O position of quercetin. Our data show that the regiospecific glucosylation of flavonoids by the quercetin 5-O-glucosyltransferase can greatly affect the overall bioavailability of flavonoids in animals. Furthermore, we provide evidence that flavonoids increase the UV-shielding activity of cocoons and thus could confer an increased survival advantage to insects contained in these cocoons. This study will lead to greater understanding of mechanisms for metabolism, uptake, and transport of dietary flavonoids, which have a variety of biological activities in animals and beneficial effects on human health.

Additional References

Green cocoons in silkworm *Bombyx mori* resulting from the quercetin 5-O-glucosyltransferase of UGT86, is an evolved response to dietary toxins. (2013) (<https://pubmed.ncbi.nlm.nih.gov/23271130>)

RELATED GEPHE

Related Genes

9 (apontic-like, Bm-iAANAT, cardinal, cortex, SCARB1, SCRB15, Wnt1, Carotenoid-binding protein (CBP), Tyrosine hydroxylase) (<https://www.gephebase.org/search-criteria?/or+Taxon ID=~7090~/and+Trait=Coloration/or+Taxon ID=~7091~/and+Trait=Coloration/and+groupHaplotypes=true#gpebase-summary-title>)

Related Haplotypes

No matches found.

EXTERNAL LINKS

COMMENTS