

GEPHE SUMMARY

	Gephebase Gene		GepheID
BCO2 = beta-carotene oxygenase 2 (<a +bco2+"beta-carotene+oxygenase+2"+#gephebase-summary-title"="" href="https://www.gephebase.org/search-criteria?/and+Gene+Gephebase=">https://www.gephebase.org/search-criteria?/and+Gene+Gephebase="+BCO2+"beta-carotene+oxygenase+2"+#gephebase-summary-title)	GP00002368		
	Entry Status	Santos	Main curator
Draft			

PHENOTYPIC CHANGE

	Trait Category		
Morphology (<a +morphology"+#gephebase-summary-title"="" href="https://www.gephebase.org/search-criteria?/and+Trait+Category=">https://www.gephebase.org/search-criteria?/and+Trait+Category="+Morphology"+#gephebase-summary-title)			
	Trait		
Coloration (<a +coloration"+#gephebase-summary-title"="" href="https://www.gephebase.org/search-criteria?/and+Trait=">https://www.gephebase.org/search-criteria?/and+Trait="+Coloration"+#gephebase-summary-title)			
	Trait State in Taxon A		
-			
	Trait State in Taxon B		
-			
	Ancestral State		
-			
	Taxonomic Status		
Intraspecific (<a +intraspecific"+#gephebase-summary-title"="" href="https://www.gephebase.org/search-criteria?/and+Taxonomic+Status=">https://www.gephebase.org/search-criteria?/and+Taxonomic+Status="+Intraspecific"+#gephebase-summary-title)			
	Taxon A		Taxon B
	Latin Name		Latin Name
-		-	
	Common Name		Common Name
-		-	
	Synonyms		Synonyms
-		-	
	Rank		Rank
-		-	
	Lineage		Lineage
-		-	
	Parent		Parent
-		-	
	NCBI Taxonomy ID		NCBI Taxonomy ID
-		-	
	is Taxon A an Intraspecies?		is Taxon B an Intraspecies?
No		No	

GENOTYPIC CHANGE

	Generic Gene Name		UniProtKB Homo sapiens
BCO2		Q9BYV7 (http://www.uniprot.org/uniprot/Q9BYV7)	
	Synonyms		GenebankID or UniProtKB
BCDO2; B-DIOX-II		()	
	String		
9606.ENSP00000350314 (http://string-db.org/newstring.cgi/show_network_section.pl?identifier=9606.ENSP00000350314)			
	Sequence Similarities		
Belongs to the carotenoid oxygenase family.			
	GO - Molecular Function		
GO:0046872 : metal ion binding (https://www.ebi.ac.uk/QuickGO/term/GO:0046872)			
GO:0003834 : beta-carotene 15,15'-monooxygenase activity (https://www.ebi.ac.uk/QuickGO/term/GO:0003834)			
GO:0010436 : carotenoid dioxygenase activity (https://www.ebi.ac.uk/QuickGO/term/GO:0010436)			
GO:0004744 : retinal isomerase activity (https://www.ebi.ac.uk/QuickGO/term/GO:0004744)			
GO:0102076 : beta,beta-carotene-9',10'-cleaving oxygenase activity (https://www.ebi.ac.uk/QuickGO/term/GO:0102076)			
GO:0016702 : oxidoreductase activity, acting on single donors with incorporation of molecular oxygen, incorporation of two atoms of oxygen (https://www.ebi.ac.uk/QuickGO/term/GO:0016702)			
	GO - Biological Process		
GO:0055114 : oxidation-reduction process			

(<https://www.ebi.ac.uk/QuickGO/term/GO:0055114>)
GO:0001523 : retinoid metabolic process
(<https://www.ebi.ac.uk/QuickGO/term/GO:0001523>)
GO:0016121 : carotene catabolic process
(<https://www.ebi.ac.uk/QuickGO/term/GO:0016121>)
GO:0042574 : retinal metabolic process
(<https://www.ebi.ac.uk/QuickGO/term/GO:0042574>)
GO:0016119 : carotene metabolic process
(<https://www.ebi.ac.uk/QuickGO/term/GO:0016119>)
GO:0016116 : carotenoid metabolic process
(<https://www.ebi.ac.uk/QuickGO/term/GO:0016116>)
GO:0051881 : regulation of mitochondrial membrane potential
(<https://www.ebi.ac.uk/QuickGO/term/GO:0051881>)
GO:2000377 : regulation of reactive oxygen species metabolic process
(<https://www.ebi.ac.uk/QuickGO/term/GO:2000377>)
GO:0042573 : retinoic acid metabolic process
(<https://www.ebi.ac.uk/QuickGO/term/GO:0042573>)
GO:0016122 : xanthophyll metabolic process
(<https://www.ebi.ac.uk/QuickGO/term/GO:0016122>)

GO - Cellular Component

GO:0005739 : mitochondrion (<https://www.ebi.ac.uk/QuickGO/term/GO:0005739>)
GO:0005622 : intracellular (<https://www.ebi.ac.uk/QuickGO/term/GO:0005622>)
GO:0005759 : mitochondrial matrix (<https://www.ebi.ac.uk/QuickGO/term/GO:0005759>)

Presumptive Null

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

Molecular Type

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=))

Aberration Type

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

Molecular Details of the Mutation

-

Experimental Evidence

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Main Reference

A multispecies BCO2 beak color polymorphism in the Darwin’s finch radiation. (2021) (<https://pubmed.ncbi.nlm.nih.gov/34687609>)

Authors

Enbody ED; Sprehn CG; Abzhanov A; Bi H; Dobрева MP; Osborne OG; Rubin CJ; Grant PR; Grant BR; Andersson L

Abstract

Carotenoid-based polymorphisms are widespread in populations of birds, fish, and reptiles, but generally little is known about the factors affecting their maintenance in populations. We report a combined field and molecular-genetic investigation of a nestling beak color polymorphism in Darwin’s finches. Beaks are pink or yellow, and yellow is recessive. Here we show that the polymorphism arose in the Gal  pagos half a million years ago through a mutation associated with regulatory change in the BCO2 gene and is shared by 14 descendant species. The polymorphism is probably a balanced polymorphism, maintained by ecological selection associated with survival and diet. In cactus finches, the frequency of the yellow genotype is correlated with cactus fruit abundance and greater hatching success and may be altered by introgressive hybridization. Polymorphisms that are hidden as adults, as here, may be far more common than is currently recognized, and contribute to diversification in ways that are yet to be discovered.

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Additional References

RELATED GEPHE

No matches found.

Related Genes

No matches found.

Related Haplotypes

EXTERNAL LINKS

COMMENTS

