

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)	GP00002139		
	Entry Status	Martin	Main curator
Published			

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		
Carotenoid content (sexual dichromatism, male-specific) (<a +carotenoid+content+(sexual+dichromatism,+male-specific)+"#gephebase-summary-title"="" href="https://www.gephebase.org/search-criteria?/and+Trait=">https://www.gephebase.org/search-criteria?/and+Trait="+Carotenoid+content+(sexual+dichromatism,+male-specific)+"#gephebase-summary-title)	Trait State in Taxon A		
sexually dimorphic red siskin (<i>Spinus cucullatus</i>)	Trait State in Taxon B		
common canaries lacking dichromatism (<i>Serinus canaria</i>)	Ancestral State		
Unknown	Taxonomic Status		
Intergeneric or Higher (<a +intergeneric+or+higher"+#gephebase-summary-title"="" href="https://www.gephebase.org/search-criteria?/and+Taxonomic+Status=">https://www.gephebase.org/search-criteria?/and+Taxonomic+Status="+Intergeneric+or+Higher"+#gephebase-summary-title)			
Taxon A		Taxon B	
Spinus cucullatus (<a +spinus+cucullatus"+#gephebase-summary-title"="" href="https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=">https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms="+Spinus+cucullatus"+#gephebase-summary-title)		Serinus canaria (<a +serinus+canaria"+#gephebase-summary-title"="" href="https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=">https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms="+Serinus+canaria"+#gephebase-summary-title)	
Common Name		Common Name	
red siskin		common canary	
Synonyms		Synonyms	
Carduelis cucullata; red siskin; Spinus cucullatus Swainson, 1820		Serinus canarius; common canary; canary; Serinus canaria (Linnaeus, 1758)	
Rank		Rank	
species		species	
Lineage		Lineage	
cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Deuterostomia; Chordata; Craniata; Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Sarcopterygii; Dipnotetrapodomorpha; Tetrapoda; Amniota; Sauropsida; Sauria; Archelosauria; Archosauria; Dinosauria; Saurischia; Theropoda; Coelurosauria; Aves; Neognathae; Passeriformes; Passeroidea; Fringillidae; Carduelinae; Spinus		cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Deuterostomia; Chordata; Craniata; Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Sarcopterygii; Dipnotetrapodomorpha; Tetrapoda; Amniota; Sauropsida; Sauria; Archelosauria; Archosauria; Dinosauria; Saurischia; Theropoda; Coelurosauria; Aves; Neognathae; Passeriformes; Passeroidea; Fringillidae; Carduelinae; Serinus	
Parent		Parent	
Spinus (siskins) - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=1647189)		Serinus () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=9134)	
NCBI Taxonomy ID		NCBI Taxonomy ID	
273489 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=273489)		9135 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=9135)	
is Taxon A an Intraspecies?		is Taxon B an Intraspecies?	
No		Yes	
		Taxon B Description	
		-	

GENOTYPIC CHANGE

	Generic Gene Name	UniProtKB Homo sapiens
BCO2	Q9BYV7 (http://www.uniprot.org/uniprot/Q9BYV7)	
	Synonyms	GenebankID or UniProtKB
BCDO2; B-DIOX-II	AAI51704 (https://www.ncbi.nlm.nih.gov/nuccore/AAI51704)	
	String	
9606.ENSPO0000350314 (http://string-db.org/newstring.cgi/show_network_section.pl?identifier=9606.ENSPO0000350314)		
	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>)

No (https://www.gephebase.org/search-criteria?/and+Presumptive Null=~No~#gephebase-summary-title)	Presumptive Null
Unknown (https://www.gephebase.org/search-criteria?/and+Molecular Type=~Unknown~#gephebase-summary-title)	Molecular Type
Unknown (https://www.gephebase.org/search-criteria?/and+Aberration Type=~Unknown~#gephebase-summary-title)	Aberration Type
Gene expression study suggests a cis-regulatory difference ; and coding mutations are unlikely to be causal	Molecular Details of the Mutation
Linkage Mapping (https://www.gephebase.org/search-criteria?/and+Experimental Evidence=~Linkage Mapping~#gephebase-summary-title)	Experimental Evidence
A genetic mechanism for sexual dichromatism in birds. (2020) (https://pubmed.ncbi.nlm.nih.gov/32527835)	Main Reference
Gazda MA; AraÃ±jo PM; Lopes RJ; Toomey MB; Andrade P; Afonso S; Marques C; Nunes L; Pereira P; Trigo S; Hill GE; Corbo JC; Carneiro M	Authors
	Abstract

Sexual dichromatism, a difference in coloration between males and females, may be due to sexual selection for ornamentation and mate choice. Here, we show that carotenoid-based dichromatism in mosaic canaries, a hybrid phenotype that arises in offspring of the sexually dichromatic red siskin and monochromatic canaries, is controlled by the gene that encodes the carotenoid-cleaving enzyme l²-carotene oxygenase 2 (BCO2). Dichromatism in mosaic canaries is explained by differential carotenoid degradation in the integument, rather than sex-specific variation in physiological functions such as pigment uptake or transport. Transcriptome analyses suggest that carotenoid degradation in the integument might be a common mechanism contributing to sexual dichromatism across finches. These results suggest that differences in ornamental coloration between sexes can evolve through simple molecular mechanisms controlled by genes of major effect.

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Additional References

RELATED GEPHE

No matches found.	Related Genes
No matches found.	Related Haplotypes

EXTERNAL LINKS

COMMENTS

