

GEPHE SUMMARY

MuPKS (https://www.gephebase.org/search-criteria?/and+GeneGephebase=^MuPKS^#gephebase-summary-title)	Gephebase Gene	GP00002121	GepheID
Published	Entry Status	Santos	Main curator

PHENOTYPIC CHANGE

Morphology (https://www.gephebase.org/search-criteria?/and+TraitCategory=^Morphology^#gephebase-summary-title)	Trait Category		
Coloration (psittacofulvin; feathers) (https://www.gephebase.org/search-criteria?/and+Trait=^Coloration (psittacofulvin; feathers)^#gephebase-summary-title)	Trait		
Yellow (head and wings) and green (body) feathers	Trait State in Taxon A		
White (head and wings) and blue (body) feathers	Trait State in Taxon B		
Taxon A	Ancestral State		
Domesticated (https://www.gephebase.org/search-criteria?/and+TaxonomicStatus=^Domesticated^#gephebase-summary-title)	Taxonomic Status		
	Taxon A		Taxon B
Melopsittacus undulatus (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=^Melopsittacus undulatus^#gephebase-summary-title)	Latin Name	Melopsittacus undulatus (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=^Melopsittacus undulatus^#gephebase-summary-title)	Latin Name
budgerigar	Common Name	budgerigar	Common Name
budgerigar	Synonyms	budgerigar	Synonyms
species	Rank	species	Rank
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; Psittaciformes; Psittaculidae; Melopsittacus	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; Psittaciformes; Psittaculidae; Melopsittacus	Lineage
Melopsittacus () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=13145)	Parent	Melopsittacus () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=13145)	Parent
13146 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=13146)	NCBI Taxonomy ID	13146 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=13146)	NCBI Taxonomy ID
Yes	is Taxon A an Intraspecies?	Yes	is Taxon B an Intraspecies?
wild budgerigar	Taxon A Description	domesticated breed	Taxon B Description

GENOTYPIC CHANGE

PKS15	Generic Gene Name	UniProtKB Lonchura striata domestica A0A218V6J0 (http://www.uniprot.org/uniprot/A0A218V6J0)
1; RLOC_00005487	Synonyms	GenebankID or UniProtKB 0
-	String	
-	Sequence Similarities	
GO:0016740 : transferase activity (https://www.ebi.ac.uk/QuickGO/term/GO:0016740)	GO - Molecular Function	
-	GO - Biological Process	
-	GO - Cellular Component	

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+No^#gephebase-summary-title))

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+Coding^#gephebase-summary-title))

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+SNP^#gephebase-summary-title))

SNP Coding Change

Nonsynonymous

Molecular Details of the Mutation

-

Experimental Evidence

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

	Taxon A	Taxon B	Position
Codon	-	-	-
Amino-acid	Arg	Trp	644

Main Reference

Genetic Mapping and Biochemical Basis of Yellow Feather Pigmentation in Budgerigars. (2017) (<https://pubmed.ncbi.nlm.nih.gov/28985565>)

Authors

Cooke TF; Fischer CR; Wu P; Jiang TX; Xie KT; Kuo J; Doctorov E; Zehnder A; Khosla C; Chuong CM; Bustamante CD

Abstract

Parrot feathers contain red, orange, and yellow polyene pigments called psittacofulvins. Budgerigars are parrots that have been extensively bred for plumage traits during the last century, but the underlying genes are unknown. Here we use genome-wide association mapping and gene-expression analysis to map the Mendelian blue locus, which abolishes yellow pigmentation in the budgerigar. We find that the blue trait maps to a single amino acid substitution (R644W) in an uncharacterized polyketide synthase (MuPKS). When we expressed MuPKS heterologously in yeast, yellow pigments accumulated. Mass spectrometry confirmed that these yellow pigments match those found in feathers. The R644W substitution abolished MuPKS activity. Furthermore, gene-expression data from feathers of different bird species suggest that parrots acquired their colors through regulatory changes that drive high expression of MuPKS in feather epithelia. Our data also help formulate biochemical models that may explain natural color variation in parrots. VIDEO ABSTRACT.

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Additional References

RELATED GEPHE

No matches found.

Related Genes

No matches found.

Related Haplotypes

EXTERNAL LINKS

COMMENTS

<https://omia.org/OMIA001701/13146/>