

GEPHE SUMMARY

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

PHENOTYPIC CHANGE

	Trait Category
Morphology (https://www.gephebase.org/search-criteria/?and+TraitCategory=%Morphology%#gephebase-summary-title)	Trait
Coloration (psittacofulvin; feathers) (https://www.gephebase.org/search-criteria/?and+Trait=%Coloration+(psittacofulvin;+feathers)%#gephebase-summary-title)	Trait State in Taxon A
Yellow (head and wings) and green (body) feathers	Trait State in Taxon B
White (head and wings) and blue (body) feathers	Ancestral State
Taxon A	Taxonomic Status

	Taxon A	Taxon B
	Latin Name	Latin Name
Melopsittacus undulatus (https://www.gephebase.org/search-criteria/?and+Taxon+and+Synonyms=%Melopsittacus+undulatus%#gephebase-summary-title)	Melopsittacus undulatus (https://www.gephebase.org/search-criteria/?and+Taxon+and+Synonyms=%Melopsittacus+undulatus%#gephebase-summary-title)	
budgerigar	Common Name	Common Name
budgerigar	Synonyms	Synonyms
species	Rank	Rank
	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; Psittaciformes; Psittaculidae; Melopsittacus	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	
Melopsittacus () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=13145)	Parent	Parent
13146 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=13146)	NCBI Taxonomy ID	NCBI Taxonomy ID
is Taxon A an Infraspecies?		is Taxon B an Infraspecies?
Yes	Taxon A Description	Taxon B Description
wild budgerigar	domesticated breed	

GENOTYPIC CHANGE

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

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

Molecular Type

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

Aberration Type

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

SNP Coding Change

Nonsynonymous

Molecular Details of the Mutation

-

Experimental Evidence

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

	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

Related Genes

No matches found.

Related Haplotypes

No matches found.

EXTERNAL LINKS

COMMENTS

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