GEPHE SUMMARY

Gephebase Gene
MuPKS (https://www.gephebase.org/search-criteria?/and+Gene Gephebase=^MuPKS^#gephebase-summary-title)

GepheID
GP00002121

Entry Status
Published

Main curator
Santos

PHENOTYPIC CHANGE

Trait Category
Morphology (https://www.gephebase.org/search-criteria?/and+Trait Category=^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
Domesticated (https://www.gephebase.org/search-criteria?/and+Taxonomic Status=^Domesticated^#gephebase-summary-title)

Taxon A

Latin Name
Melopsittacus undulatus (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=^Melopsittacus undulatus^#gephebase-summary-title)

Common Name
budgerigar

Synonyms
budgerigar

Rank
species

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

Parent
Melopsittacus () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 13145)

NCBI Taxonomy ID
13146 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 13146)

is Taxon A an Infraspecies?
Yes

Taxon A Description
wild budgerigar

Taxon B

Latin Name
Melopsittacus undulatus (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=^Melopsittacus undulatus^#gephebase-summary-title)

Common Name
budgerigar

Synonyms
budgerigar

Rank
species

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

Parent
Melopsittacus () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 13145)

NCBI Taxonomy ID
13146 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 13146)

is Taxon B an Infraspecies?
Yes

Taxon B Description
domesticated breed

GENOTYPIC CHANGE

Generic Gene Name
PKS15

Synonyms
1; RLOC_00005487

String
-

Sequence Similarities
-

GO - Molecular Function
GO:0016740 : transferase activity (https://www.ebi.ac.uk/QuickGO/term/GO:0016740)

GO - Biological Process
-

GO - Cellular Component
-

UniProtKB Lonchura striata domestica
A0A218V6J0 (http://www.uniprot.org/uniprot/A0A218V6J0)

GenebankID or UniProtKB
()

Presumptive Null

No (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)

Aberration Type

SNP (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)

	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/