## GEPHE SUMMARY

Gephebase Gene
opsin - (SWS1) (https://www.gephebase.org/search-criteria?/and+Gene Gephebase=^opsin - (SWS1)^#gephebase-summary-title)

GepheID
GP00000760

Entry Status
Published

Main curator
Courtier

## PHENOTYPIC CHANGE

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

Trait
Color vision (UV-shift) (https://www.gephebase.org/search-criteria?/and+Trait=^Color vision (UV-shift)^#gephebase-summary-title)

Trait State in Taxon A
Other birds

Trait State in Taxon B
Melopsittacus undulatus

Ancestral State
Taxon A

Taxonomic Status
Intergeneric or Higher (https://www.gephebase.org/search-criteria?/and+Taxonomic Status=^Intergeneric or Higher^#gephebase-summary-title)

### Taxon A

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

Common Name
birds

Synonyms
avian; birds

Rank
class

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

Parent
Coelurosauria () - (Rank: no rank) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 436492 )

NCBI Taxonomy ID
8782 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 8782 )

is Taxon A an Infraspecies?
No

### 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?
No

## GENOTYPIC CHANGE

Generic Gene Name
OPN1SW

Synonyms
BCP; BOP; CBT

String
9606.ENSP00000249389 (http://string-db.org/newstring_cgi/show_network_section.pl?identifier=9606.ENSP00000249389 )

Sequence Similarities
Belongs to the G-protein coupled receptor 1 family. Opsin subfamily.

GO - Molecular Function
GO:0038023 : signaling receptor activity (https://www.ebi.ac.uk/QuickGO/term/GO:0038023)
GO:0008020 : G protein-coupled photoreceptor activity (https://www.ebi.ac.uk/QuickGO/term/GO:0008020)

GO - Biological Process
GO:0007165 : signal transduction (https://www.ebi.ac.uk/QuickGO/term/GO:0007165)

UniProtKB Homo sapiens
P03999 (http://www.uniprot.org/uniprot/P03999)

GenebankID or UniProtKB
ACV60158 (https://www.ncbi.nlm.nih.gov/nuccore/ACV60158)

GO:0007186 : G protein-coupled receptor signaling pathway
(https://www.ebi.ac.uk/QuickGO/term/GO:0007186)
GO:0001523 : retinoid metabolic process
(https://www.ebi.ac.uk/QuickGO/term/GO:0001523)
GO:0018298 : protein-chromophore linkage
(https://www.ebi.ac.uk/QuickGO/term/GO:0018298)
GO:0007601 : visual perception (https://www.ebi.ac.uk/QuickGO/term/GO:0007601)
GO:0071482 : cellular response to light stimulus
(https://www.ebi.ac.uk/QuickGO/term/GO:0071482)
GO:0007602 : phototransduction (https://www.ebi.ac.uk/QuickGO/term/GO:0007602)

GO - Cellular Component

GO:0005887 : integral component of plasma membrane
(https://www.ebi.ac.uk/QuickGO/term/GO:0005887)
GO:0001750 : photoreceptor outer segment
(https://www.ebi.ac.uk/QuickGO/term/GO:0001750)
GO:0097381 : photoreceptor disc membrane
(https://www.ebi.ac.uk/QuickGO/term/GO:0097381)

Mutation #1

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

S86A and S90C - both have phenotypic effect - effect of S86 tested in Anolis carolinensis

Experimental Evidence

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

| | Taxon A | Taxon B | Position |
|---|---|---|---|
| Codon | - | - | - |
| Amino-acid | Ser | Ala | 86 |

Main Reference

Ultraviolet pigments in birds evolved from violet pigments by a single amino acid change. (2000) (https://pubmed.ncbi.nlm.nih.gov/10861005)

Authors

Yokoyama S; Radlwimmer FB; Blow NS

Abstract

UV vision has profound effects on the evolution of organisms by affecting such behaviors as mating preference and foraging strategies. Despite its importance, the molecular basis of UV vision is not known. Here, we have transformed the zebra finch UV pigment into a violet pigment by incorporating one amino acid change, C84S. By incorporating the reverse mutations, we have also constructed UV pigments from the orthologous violet pigments of the pigeon and chicken. These results and comparative amino acid sequence analyses of the pigments in vertebrates demonstrate that many avian species have achieved their UV vision by S84C.

Additional References

The molecular evolution of avian ultraviolet- and violet-sensitive visual pigments. (2007) (https://pubmed.ncbi.nlm.nih.gov/17556758)

Mutation #2

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

S86A and S90C - both have phenotypic effect - S90C corresponds to S84C in PMID 10861005

Experimental Evidence

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

| | Taxon A | Taxon B | Position |
|---|---|---|---|
| Codon | - | - | - |
| Amino-acid | Ser | Cys | 90 |

Main Reference

Ultraviolet pigments in birds evolved from violet pigments by a single amino acid change. (2000) (https://pubmed.ncbi.nlm.nih.gov/10861005)

Authors

Yokoyama S; Radlwimmer FB; Blow NS

Abstract

UV vision has profound effects on the evolution of organisms by affecting such behaviors as mating preference and foraging strategies. Despite its importance, the molecular basis of UV vision is not known. Here, we have transformed the zebra finch UV pigment into a violet pigment by incorporating one amino acid change, C84S. By incorporating the reverse mutations, we have also constructed UV pigments from the orthologous violet pigments of the pigeon and chicken. These results and comparative amino acid sequence analyses of the pigments in vertebrates demonstrate that many avian species have achieved their UV vision by S84C.

Additional References

The molecular evolution of avian ultraviolet- and violet-sensitive visual pigments. (2007) (https://pubmed.ncbi.nlm.nih.gov/17556758)

## RELATED GEPHE

Related Genes

No matches found.

Related Haplotypes

5 (https://www.gephebase.org/search-criteria?/or+Gene Gephebase=^opsin - (SWS1)^/and+Taxon ID=^8782^/or+Gene Gephebase=^opsin - (SWS1)^/and+Taxon ID=^13146^#gephebase-summary-title)

## EXTERNAL LINKS

## COMMENTS

@SeveralMutationsWithEffect