

GEPHE SUMMARY

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

Gephebase Gene GP00000763 GepheID

Entry Status Martin Main curator

Published

PHENOTYPIC CHANGE

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

Trait Category

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

Trait

Other birds

Trait State in Taxon A

Trogon curucui

Trait State in Taxon B

Taxon A

Ancestral State

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

Taxonomic Status

Taxon A	Latin Name	Taxon B	Latin Name
Aves ( <a href="https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=^Aves^#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=^Aves^#gephebase-summary-title</a> )	Trogon curucui ( <a href="https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=^Trogon+curucui^#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=^Trogon curucui^#gephebase-summary-title</a> )	Trogon curucui ( <a href="https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=^Trogon+curucui^#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=^Trogon curucui^#gephebase-summary-title</a> )	Trogon curucui ( <a href="https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=^Trogon+curucui^#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=^Trogon curucui^#gephebase-summary-title</a> )
birds		-	
avian; birds		-	
class		species	
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		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; Trogoniformes; Trogonidae; Trogon	
Coelurosauria () - (Rank: no rank) ( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=436492">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=436492</a> )		Trogon () - (Rank: genus) ( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=56310">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=56310</a> )	
8782 ( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=8782">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=8782</a> )		59414 ( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=59414">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=59414</a> )	
No	is Taxon A an Intraspecies?	No	is Taxon B an Intraspecies?

GENOTYPIC CHANGE

OPN1SW

Generic Gene Name P03999 (<http://www.uniprot.org/uniprot/P03999>) UniProtKB Homo sapiens

BCP; BOP; CBT

Synonyms AAP23988 (<https://www.ncbi.nlm.nih.gov/nuccore/AAP23988>) GenebankID or UniProtKB

String

9606.ENSPO0000249389  
([http://string-db.org/newstring.cgi/show\\_network\\_section.pl?identifier=9606.ENSPO0000249389](http://string-db.org/newstring.cgi/show_network_section.pl?identifier=9606.ENSPO0000249389))

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>)

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)

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

S86F

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	-	-	-

Main Reference

Complex distribution of avian color vision systems revealed by sequencing the SWS1 opsin from total DNA. (2003) (https://pubmed.ncbi.nlm.nih.gov/12716987)

Authors

Odeen A; Hastad O

Abstract

To gain insights into the evolution and ecology of visually acute animals such as birds, biologists often need to understand how these animals perceive colors. This poses a problem, since the human eye is of a different design than that of most other animals. The standard solution is to examine the spectral sensitivity properties of animal retinas through microspectrophotometry—a procedure that is rather complicated and therefore only has allowed examinations of a limited number of species to date. We have developed a faster and simpler molecular method, which can be used to estimate the color sensitivities of a bird by sequencing a part of the gene coding for the ultraviolet or violet absorbing opsin in the avian retina. With our method, there is no need to sacrifice the animal, and it thereby facilitates large screenings, including rare and endangered species beyond the reach of microspectrophotometry. Color vision in birds may be categorized into two classes: one with a short-wavelength sensitivity biased toward violet (VS) and the other biased toward ultraviolet (UVS). Using our method on 45 species from 35 families, we demonstrate that the distribution of avian color vision is more complex than has previously been shown. Our data support VS as the ancestral state in birds and show that UVS has evolved independently at least four times. We found species with the UVS type of color vision in the orders Psittaciformes and Passeriformes, in agreement with previous findings. However, species within the families Corvidae and Tyrannidae did not share this character with other passeriforms. We also found UVS type species within the Laridae and Struthionidae families. Raptors (Accipitridae and Falconidae) are of the violet type, giving them a vision system different from their passeriform prey. Intriguing effects on the evolution of color signals can be expected from interactions between predators and prey. Such interactions may explain the presence of UVS in Laridae and Passeriformes.

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=^59414^#gephebase-summary-title)

EXTERNAL LINKS

COMMENTS

