

## GEPHE SUMMARY

|   |              |                |            |              |
|---|--------------|----------------|------------|--------------|
| opsin - (SWS1) ( <a (sws1)^#gephebase-summary-title"="" +opsin+"-="" href="https://www.gephebase.org/search-criteria?/and+Gene+Gephebase=">https://www.gephebase.org/search-criteria?/and+Gene Gephebase=^opsin - (SWS1)^#gephebase-summary-title</a> ) |              | Gephebase Gene | GP00001694 | GepheID      |
| Published   | Entry Status | Courtier       |            | Main curator |

## PHENOTYPIC CHANGE

|  |                             |   |                             |  |
|--|-----------------------------|---|-----------------------------|--|
| Physiology ( <a +physiology+"#gephebase-summary-title"="" href="https://www.gephebase.org/search-criteria?/and+Trait+Category=">https://www.gephebase.org/search-criteria?/and+Trait Category=^Physiology^#gephebase-summary-title</a> )                                   |                             | Trait Category  |                             |  |
| Color vision (UV-shift) ( <a +color+vision+(uv-shift)^#gephebase-summary-title"="" href="https://www.gephebase.org/search-criteria?/and+Trait=">https://www.gephebase.org/search-criteria?/and+Trait=^Color vision (UV-shift)^#gephebase-summary-title</a> )               |                             | Trait   |                             |  |
| Other Vertebrates  | Trait State in Taxon A      |   |                             |  |
| Birds  | Trait State in Taxon B      |   |                             |  |
| Taxon A  | Ancestral State             |   |                             |  |
| Intergenic or Higher ( <a +intergenic+or+higher+"#gephebase-summary-title"="" href="https://www.gephebase.org/search-criteria?/and+Taxonomic+Status=">https://www.gephebase.org/search-criteria?/and+Taxonomic Status=^Intergenic or Higher^#gephebase-summary-title</a> ) |                             | Taxonomic Status  |                             |  |
|  | Taxon A                     |   | Taxon B                     |  |
| Vertebrata   | Latin Name                  | Aves  | Latin Name                  |  |
| ( <a +vertebrata+"#gephebase-summary-title"="" href="https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=">https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=^Vertebrata^#gephebase-summary-title</a> )                                      | Common Name                 | ( <a +aves+"#gephebase-summary-title"="" href="https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=">https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=^Aves^#gephebase-summary-title</a> )   | Common Name                 |  |
| vertebrates  | Synonyms                    | birds   | Synonyms                    |  |
| vertebrates; Vertebrata Cuvier, 1812   | Rank                        | avian; birds  | Rank                        |  |
| no rank  | Lineage                     | class   | Lineage                     |  |
| cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Deuterostomia; Chordata; Craniata  | Parent                      | 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                      |  |
| Craniata () - (Rank: subphylum) ( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 89593">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 89593</a> )  | NCBI Taxonomy ID            | 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> )  | NCBI Taxonomy ID            |  |
| 7742 ( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 7742">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 7742</a> )   | is Taxon A an Infrappecies? | 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> )  | is Taxon B an Infrappecies? |  |
| No   |                             | No  |                             |  |

## GENOTYPIC CHANGE

|   |                         |  |                         |
|---|-------------------------|--|-------------------------|
| OPN1SW  | Generic Gene Name       | P03999 ( <a href="http://www.uniprot.org/uniprot/P03999">http://www.uniprot.org/uniprot/P03999</a> )                   | UniProtKB Homo sapiens  |
| BCP; BOP; CBT   | Synonyms                | ACV60158 ( <a href="https://www.ncbi.nlm.nih.gov/nuccore/ACV60158">https://www.ncbi.nlm.nih.gov/nuccore/ACV60158</a> ) | GenebankID or UniProtKB |
| 9606.ENSPP00000249389 ( <a href="http://string-db.org/newstring_cgi/show_network_section.pl?identifier= 9606.ENSPP00000249389">http://string-db.org/newstring_cgi/show_network_section.pl?identifier= 9606.ENSPP00000249389</a> ) | String                  |  |                         |
| Belongs to the G-protein coupled receptor 1 family. Opsin subfamily.  | Sequence Similarities   |  |                         |
| GO:0038023 : signaling receptor activity ( <a href="https://www.ebi.ac.uk/QuickGO/term/GO:0038023">https://www.ebi.ac.uk/QuickGO/term/GO:0038023</a> )  | GO - Molecular Function |  |                         |
| GO:0008020 : G protein-coupled photoreceptor activity ( <a href="https://www.ebi.ac.uk/QuickGO/term/GO:0008020">https://www.ebi.ac.uk/QuickGO/term/GO:0008020</a> )   |                         |  |                         |
| GO:0007165 : signal transduction ( <a href="https://www.ebi.ac.uk/QuickGO/term/GO:0007165">https://www.ebi.ac.uk/QuickGO/term/GO:0007165</a> )  | GO - Biological Process |  |                         |
| 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](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

V116L

Experimental Evidence

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

|            | Taxon A | Taxon B | Position |
|------------|---------|---------|----------|
| Codon      | -       | -       | -        |
| Amino-acid | Val     | Leu     | 116      |

Main Reference

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

Authors

Carvalho LS; Cowing JA; Wilkie SE; Bowmaker JK; Hunt DM

Abstract

The shortwave-sensitive SWS1 class of vertebrate visual pigments range in lambda(max) from the violet (385-445 nm) to the ultraviolet (UV) (365-355 nm), with UV-sensitivity almost certainly ancestral. In birds, however, the UV-sensitive pigments present in a number of species have evolved secondarily from an avian violet-sensitive (VS) pigment. All avian VS pigments expressed in vitro to date encode Ser86 whereas Phe86 is present in all non-avian ultraviolet sensitive (UVS) pigments. In this paper, we show by site directed mutagenesis of avian VS pigments that Ser86 is required in an avian VS pigment to maintain violet-sensitivity and therefore underlies the evolution of avian VS pigments. The major mechanism for the evolution of avian UVS pigments from an ancestral avian VS pigment is undoubtedly a Ser90Cys substitution. However, Phe86, as found in the Blue-crowned trogon, will also short-wave shift the pigeon VS pigment into the UV whereas Ala86 and Cys86 which are also found in natural avian pigments do not generate short-wave shifts when substituted into the pigeon pigment. From available data on avian SWS1 pigments, it would appear that UVS pigments have evolved on at least 5 separate occasions and utilize 2 different mechanisms for the short-wave shift.

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

10 (Green-sensitive opsin (RH2), Rhodopsin (RH1), opsin - rhodopsin (LWS), opsin - rhodopsin1 (RH1), opsin - (SWS2), opsin - (SWS2B), Rx1, opsin - rhodopsin (MWS=duplicate of LWS), opsin - rhodopsin1-A (RH1-A), opsin - rhodopsin1-B (RH1-B)) ([https://www.gephebase.org/search-criteria?/or+Taxon ID+7742^/and+Trait+Color vision/or+Taxon ID+8782^/and+Trait+Color vision/and+groupHaplotypes=true#gephebase-summary-title](https://www.gephebase.org/search-criteria?/or+Taxon+ID+7742^/and+Trait+Color+vision/or+Taxon+ID+8782^/and+Trait+Color+vision/and+groupHaplotypes=true#gephebase-summary-title))

Related Haplotypes

14 ([https://www.gephebase.org/search-criteria?/or+Gene Gephebase+opsin - \(SWS1\)^/and+Taxon ID+7742^/or+Gene Gephebase+opsin - \(SWS1\)^/and+Taxon ID+8782^#gephebase-summary-title](https://www.gephebase.org/search-criteria?/or+Gene+Gephebase+opsin+-(SWS1)^/and+Taxon+ID+7742^/or+Gene+Gephebase+opsin+-(SWS1)^/and+Taxon+ID+8782^#gephebase-summary-title))

## EXTERNAL LINKS

## COMMENTS

