

## GEPHE SUMMARY

opsin - rhodopsin1 (RH1) ( <a href="https://www.gephebase.org/search-criteria?/and+Gene">https://www.gephebase.org/search-criteria?/and+Gene</a> )		Gephebase Gene	GP00000782	GepheID
Gephebase="opsin - rhodopsin1 (RH1)"#gephebase-summary-title)				Main curator
Published		Entry Status	Courtier	

## PHENOTYPIC CHANGE

Physiology ( <a href="https://www.gephebase.org/search-criteria?/and+Trait">https://www.gephebase.org/search-criteria?/and+Trait</a> )		Trait Category		
Category="Physiology"#gephebase-summary-title)				
Color vision (blue shift) ( <a color"="" href="https://www.gephebase.org/search-criteria?/and+Trait=">https://www.gephebase.org/search-criteria?/and+Trait="Color</a> )		Trait		
vision (blue shift)"#gephebase-summary-title)				
Other fishes		Trait State in Taxon A		
Sebastolobus altivelis		Trait State in Taxon B		
Taxon A		Ancestral State		
Intergenic or Higher ( <a href="https://www.gephebase.org/search-criteria?/and+Taxonomic">https://www.gephebase.org/search-criteria?/and+Taxonomic</a> )		Taxonomic Status		
Status="Intergenic or Higher"#gephebase-summary-title)				

Taxon A		Taxon B	
	Latin Name		Latin Name
Teleostei		Sebastolobus altivelis	
( <a href="https://www.gephebase.org/search-criteria?/and+Taxon">https://www.gephebase.org/search-criteria?/and+Taxon</a> and		( <a href="https://www.gephebase.org/search-criteria?/and+Taxon">https://www.gephebase.org/search-criteria?/and+Taxon</a> and	
Synonyms="Teleostei"#gephebase-summary-title)		Synonyms="Sebastolobus	
teleost fishes	Common Name	-	Common Name
teleost fishes	Synonyms	-	Synonyms
infraclass	Rank	species	Rank
cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Deuterostomia;	Lineage	cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Deuterostomia;	Lineage
Chordata; Craniata; Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii;		Chordata; Craniata; Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii;	
Actinopteri; Neopterygii		Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupecocephala;	
Neopterygii () - (Rank: subclass)	Parent	Euteleosteomorpha; Neoteleostei; Eurypterygia; Ctenosquamata; Acanthomorpha;	
( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=41665">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=41665</a> )		Euacanthomorpha; Percormorphaceae; Eupercaria; Perciformes; Scorpaenoidei;	
32443	NCBI Taxonomy ID	Sebastidae; Sebastolobinae; Sebastolobus	Parent
( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=32443">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=32443</a> )		Sebastolobus () - (Rank: genus)	
No	is Taxon A an Intraspecies?	( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=8109">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=8109</a> )	NCBI Taxonomy ID
		8110	
		( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=8110">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=8110</a> )	is Taxon B an Intraspecies?
		No	

## GENOTYPIC CHANGE

RHO	Generic Gene Name	P08100 ( <a href="http://www.uniprot.org/uniprot/P08100">http://www.uniprot.org/uniprot/P08100</a> )	UniProtKB Homo sapiens
RP4; OPN2; CSNBAD1	Synonyms	0	GenebankID or UniProtKB
9606.ENSPP00000296271	String		
( <a href="http://string-db.org/newstring.cgi/show_network_section.pl?identifier=9606.ENSPP00000296271">http://string-db.org/newstring.cgi/show_network_section.pl?identifier=9606.ENSPP00000296271</a> )			
Belongs to the G-protein coupled receptor 1 family. Opsin subfamily.	Sequence Similarities		
	GO - Molecular Function		
GO:0046872 : metal ion binding ( <a href="https://www.ebi.ac.uk/QuickGO/term/GO:0046872">https://www.ebi.ac.uk/QuickGO/term/GO:0046872</a> )			
GO:0004930 : G protein-coupled receptor activity			
( <a href="https://www.ebi.ac.uk/QuickGO/term/GO:0004930">https://www.ebi.ac.uk/QuickGO/term/GO:0004930</a> )			
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:0005502 : 11-cis retinal binding (<https://www.ebi.ac.uk/QuickGO/term/GO:0005502>)

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:0006468 : protein phosphorylation

(<https://www.ebi.ac.uk/QuickGO/term/GO:0006468>)

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:0016038 : absorption of visible light

(<https://www.ebi.ac.uk/QuickGO/term/GO:0016038>)

GO:0045494 : photoreceptor cell maintenance

(<https://www.ebi.ac.uk/QuickGO/term/GO:0045494>)

GO:0007603 : phototransduction, visible light

(<https://www.ebi.ac.uk/QuickGO/term/GO:0007603>)

GO:0022400 : regulation of rhodopsin mediated signaling pathway

(<https://www.ebi.ac.uk/QuickGO/term/GO:0022400>)

GO:0060041 : retina development in camera-type eye

(<https://www.ebi.ac.uk/QuickGO/term/GO:0060041>)

GO:0016056 : rhodopsin mediated signaling pathway

(<https://www.ebi.ac.uk/QuickGO/term/GO:0016056>)

GO - Cellular Component

GO:0016021 : integral component of membrane

(<https://www.ebi.ac.uk/QuickGO/term/GO:0016021>)

GO:0005886 : plasma membrane (<https://www.ebi.ac.uk/QuickGO/term/GO:0005886>)

GO:0000139 : Golgi membrane (<https://www.ebi.ac.uk/QuickGO/term/GO:0000139>)

GO:0005887 : integral component of plasma membrane

(<https://www.ebi.ac.uk/QuickGO/term/GO:0005887>)

GO:0005794 : Golgi apparatus (<https://www.ebi.ac.uk/QuickGO/term/GO:0005794>)

GO:0005911 : cell-cell junction (<https://www.ebi.ac.uk/QuickGO/term/GO:0005911>)

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>)

GO:0060170 : ciliary membrane (<https://www.ebi.ac.uk/QuickGO/term/GO:0060170>)

GO:0030660 : Golgi-associated vesicle membrane

(<https://www.ebi.ac.uk/QuickGO/term/GO:0030660>)

GO:0001917 : photoreceptor inner segment

(<https://www.ebi.ac.uk/QuickGO/term/GO:0001917>)

GO:0060342 : photoreceptor inner segment membrane

(<https://www.ebi.ac.uk/QuickGO/term/GO:0060342>)

GO:0042622 : photoreceptor outer segment membrane

(<https://www.ebi.ac.uk/QuickGO/term/GO:0042622>)

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

D83N and A292S

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	Asp	Asn	83

Main Reference

Modulation of the absorption maximum of rhodopsin by amino acids in the C-terminus. (2007 Mar-Apr) (<https://pubmed.ncbi.nlm.nih.gov/16922606>)

Authors

Yokoyama S; Tada T; Yamato T

Abstract

Vision begins when light is absorbed by visual pigments. It is commonly believed that the absorption spectra of visual pigments are modulated by interactions between the retinal and amino acids within or near 4.5 angstroms of the retinal in the transmembrane (TM) segments. However, this dogma has not been rigorously tested. In this study, we show that the retinal-opsin interactions extend well beyond the retinal binding pocket. We found that, although it is positioned outside of TM segments, the C-terminus of the rhodopsin in the

rockfish longspine thornyhead (*Sebastolobus altivelis*) modulates its lambda(max) by interacting mainly with the last TM segment. Our results illustrate how amino acids in the C-terminus are likely to interact with the retinal. We anticipate our analyses to be a starting point for viewing the spectral tuning of visual pigments as interactions between the retinal and key amino acids that are distributed throughout the entire pigment.

Additional References

Elucidation of phenotypic adaptations: Molecular analyses of dim-light vision proteins in vertebrates. (2008) (<https://pubmed.ncbi.nlm.nih.gov/18768804>)

#### 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

D83N and A292S

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	Ala	Ser	292

Main Reference

Modulation of the absorption maximum of rhodopsin by amino acids in the C-terminus. (2007 Mar-Apr) (<https://pubmed.ncbi.nlm.nih.gov/16922606>)

Authors

Yokoyama S; Tada T; Yamato T

Abstract

Vision begins when light is absorbed by visual pigments. It is commonly believed that the absorption spectra of visual pigments are modulated by interactions between the retinal and amino acids within or near 4.5 angstroms of the retinal in the transmembrane (TM) segments. However, this dogma has not been rigorously tested. In this study, we show that the retinal-opsin interactions extend well beyond the retinal binding pocket. We found that, although it is positioned outside of TM segments, the C-terminus of the rhodopsin in the rockfish longspine thornyhead (*Sebastolobus altivelis*) modulates its lambda(max) by interacting mainly with the last TM segment. Our results illustrate how amino acids in the C-terminus are likely to interact with the retinal. We anticipate our analyses to be a starting point for viewing the spectral tuning of visual pigments as interactions between the retinal and key amino acids that are distributed throughout the entire pigment.

Additional References

Elucidation of phenotypic adaptations: Molecular analyses of dim-light vision proteins in vertebrates. (2008) (<https://pubmed.ncbi.nlm.nih.gov/18768804>)

## RELATED GEPHE

Related Genes

9 (Green-sensitive opsin (RH2), Rhodopsin (RH1), opsin - rhodopsin (LWS), opsin - (SWS1), opsin - (SWS2), opsin - (SWS2B), Rx1, opsin - rhodopsin1-A (RH1-A), opsin - rhodopsin1-B (RH1-B)) (<https://www.gephebase.org/search-criteria?/or+Taxon ID=^32443^/and+Trait=Color vision/or+Taxon ID=^8110^/and+Trait=Color vision/and+groupHaplotypes=true#gephebase-summary-title>)

Related Haplotypes

4 ([https://www.gephebase.org/search-criteria?/or+Gene Gephebase=^opsin - rhodopsin1 \(RH1\)^/and+Taxon ID=^32443^/or+Gene Gephebase=^opsin - rhodopsin1 \(RH1\)^/and+Taxon ID=^8110^#gephebase-summary-title](https://www.gephebase.org/search-criteria?/or+Gene Gephebase=^opsin - rhodopsin1 (RH1)^/and+Taxon ID=^32443^/or+Gene Gephebase=^opsin - rhodopsin1 (RH1)^/and+Taxon ID=^8110^#gephebase-summary-title))

## EXTERNAL LINKS

## COMMENTS

Sebastolobus altivelis is the rockfish longspine thornyhead. @SeveralMutationsWithEffect

