

GEPHE SUMMARY

opsin - rhodopsin (LWS) (https://www.gephebase.org/search-criteria?/and+Gene)		Gephebase Gene	GP00001703	GepheID
Gephebase="opsin - rhodopsin (LWS)"#gephebase-summary-title)				Main curator
Published		Entry Status	Courtier	

PHENOTYPIC CHANGE

Physiology (https://www.gephebase.org/search-criteria?/and+Trait)		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)		Trait	
vision (blue-shift)"#gephebase-summary-title)			
Mammals		Trait State in Taxon A	
Tursiops truncatus - blue shift		Trait State in Taxon B	
Taxon A		Ancestral State	
Intergenic or Higher (https://www.gephebase.org/search-criteria?/and+Taxonomic)		Taxonomic Status	
Status="Intergenic or Higher"#gephebase-summary-title)			
Taxon A		Taxon B	
Mammalia	Latin Name	Tursiops truncatus	Latin Name
(https://www.gephebase.org/search-criteria?/and+Taxon)		(https://www.gephebase.org/search-criteria?/and+Taxon)	
Synonyms="Mammalia"#gephebase-summary-title)	Common Name	truncatus"#gephebase-summary-title)	Common Name
mammals		bottlenose dolphin	
mammals	Synonyms	bottlenose dolphin; Atlantic bottle-nosed dolphin; bottle-nosed dolphin; Tursiops truncatus	Synonyms
class	Rank	Gervais, 1855	Rank
cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Deuterostomia; Chordata; Craniata; Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Sarcopterygii; Dipnotetrapodomorpha; Tetrapoda; Amniota	Lineage	species	Lineage
Amniota (amniotes) - (Rank: no rank)	Parent	cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Deuterostomia; Chordata; Craniata; Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Sarcopterygii; Dipnotetrapodomorpha; Tetrapoda; Amniota; Mammalia; Theria; Eutheria; Boreoeutheria; Laurasiatheria; Cetartiodactyla; Cetacea; Odontoceti; Delphinidae; Tursiops	Parent
(https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=32524)	NCBI Taxonomy ID	Tursiops () - (Rank: genus)	NCBI Taxonomy ID
40674		(https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=9738)	
(https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=40674)	is Taxon A an Intraspecies?	9739	is Taxon B an Intraspecies?
No		(https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=9739)	
		No	

GENOTYPIC CHANGE

OPN1LW	Generic Gene Name	P04000 (http://www.uniprot.org/uniprot/P04000)	UniProtKB Homo sapiens
RCP	Synonyms	()	GenebankID or UniProtKB
9606.ENSPO0000358967	String		
(http://string-db.org/newstring.cgi/show_network_section.pl?identifier=9606.ENSPO0000358967)	Sequence Similarities		
Belongs to the G-protein coupled receptor 1 family. Opsin subfamily.	GO - Molecular Function		
	GO:0008020 : G protein-coupled photoreceptor activity		
	(https://www.ebi.ac.uk/QuickGO/term/GO:0008020)		
	GO:0009881 : photoreceptor activity (https://www.ebi.ac.uk/QuickGO/term/GO:0009881)		
	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:0032467 : positive regulation of cytokinesis
 (<https://www.ebi.ac.uk/QuickGO/term/GO:0032467>)

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

A292S

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	Ala	Ser	292

Main Reference

Mechanism of spectral tuning in the dolphin visual pigments. (1998) (<https://pubmed.ncbi.nlm.nih.gov/9471225>)

Authors

Fasick JI; Robsinson PR

Abstract

The absorption maxima of both rod and cone visual pigments of the bottlenose dolphin (*Tursiops truncatus*) are blue-shifted relative to those of terrestrial mammals. A comparison of the sequence of the dolphin rod photopigment gene with that of the bovine rod suggests that, for the 28 nonidentical amino acids, three amino acid substitutions at positions 83, 292, and 299 in the dolphin rod pigment are responsible for the 10 nm blue shift in absorption maxima. A similar comparison of the dolphin long-wavelength sensitive (LWS) cone photopigment gene with those of the human LWS cones suggests that a single substitution at position 292 (using the convention of rhodopsin numbering) in the dolphin LWS cone pigment results in a blue shift in absorption maxima. A mutagenesis study reveals that the combination of the three dolphin specific substitutions in the bovine rod pigment (83D to 83N, 292A to 292S, and 299A to 299S) causes a blue shift from the wild-type lambda_{max} of 499 nm to 389 nm. The single substitution in the dolphin LWS cone pigment (292S to 292A) causes a red shift from the wild-type lambda_{max} of 524 nm to 552 nm. The interactions of the three amino acids identified in the rod pigment with the chromophore may be a general mechanism for blue shifting in rod visual pigments. Furthermore, the single substitution in the dolphin LWS opsin gene is a novel mechanism of wavelength modulation in mammalian LWS pigments.

Additional References

RELATED GEPHE

Related Genes

3 (opsin - (SWS1), opsin - rhodopsin1 (RH1), opsin - rhodopsin (MWS=duplicate of LWS)) ([https://www.gephebase.org/search-criteria?/or+Taxon ID=~40674~/and+Trait=Color vision/or+Taxon ID=~9739~/and+Trait=Color vision/and+groupHaplotypes=true#gephebase-summary-title](https://www.gephebase.org/search-criteria?/or+Taxon+ID=~40674~/and+Trait=Color+vision/or+Taxon+ID=~9739~/and+Trait=Color+vision/and+groupHaplotypes=true#gephebase-summary-title))

Related Haplotypes

5 ([https://www.gephebase.org/search-criteria?/or+Gene Gephebase=~opsin - rhodopsin \(LWS\)/and+Taxon ID=~40674~/or+Gene Gephebase=~opsin - rhodopsin \(LWS\)/and+Taxon ID=~9739~#gephebase-summary-title](https://www.gephebase.org/search-criteria?/or+Gene+Gephebase=~opsin-rhodopsin(LWS)/and+Taxon+ID=~40674~/or+Gene+Gephebase=~opsin-rhodopsin(LWS)/and+Taxon+ID=~9739~#gephebase-summary-title))

EXTERNAL LINKS

COMMENTS

