

GEPHE SUMMARY

Gephebase Gene		GepheID
opsin - (SWS1) (<a (sws1)""="" +opsin+"-="" href="https://www.gephebase.org/search-criteria?/and+Gene+Gephebase=">#gephebase-summary-title)	GP00000765	
	Entry Status	Courtier
Published		Main curator

PHENOTYPIC CHANGE

Trait Category		Trait	
Physiology (<a +physiology"="" href="https://www.gephebase.org/search-criteria?/and+Trait+Category=">#gephebase-summary-title)		Color vision (violet-shift) (<a +color+vision+(violet-shift)""="" href="https://www.gephebase.org/search-criteria?/and+Trait=">#gephebase-summary-title)	
Trait State in Taxon A		Trait State in Taxon B	
Other amniotes		Ancestral State	
Taxon A		Taxonomic Status	
Intergeneric or Higher (<a +intergeneric+or+higher"="" href="https://www.gephebase.org/search-criteria?/and+Taxonomic+Status=">#gephebase-summary-title)			
Taxon A		Taxon B	
Latin Name		Latin Name	
Amniota (<a +amniota"="" href="https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=">#gephebase-summary-title)		Xenopus laevis (<a +xenopus+laevis"="" href="https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=">#gephebase-summary-title)	
Common Name		Common Name	
amniotes		African clawed frog	
Synonyms		Synonyms	
amniotes		Bufo laevis; African clawed frog; clawed frog; common platanna; platanna; Xenopus laevis (Daudin, 1802); Xenopus leavis	
Rank		Rank	
no rank		species	
Lineage		Lineage	
cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Deuterostomia; Chordata; Craniata; Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Sarcopterygii; Dipnotetrapodomorpha; Tetrapoda		cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Deuterostomia; Chordata; Craniata; Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Sarcopterygii; Dipnotetrapodomorpha; Tetrapoda; Amphibia; Batrachia; Anura; Pipoidea; Pipidae; Xenopodinae; Xenopus; Xenopus	
Parent		Parent	
Tetrapoda (tetrapods) - (Rank: no rank) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 32523)		Xenopus () - (Rank: subgenus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 262014)	
NCBI Taxonomy ID		NCBI Taxonomy ID	
32524 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 32524)		8355 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 8355)	
is Taxon A an Intraspecies?		is Taxon B an Intraspecies?	
No		No	

GENOTYPIC CHANGE

Generic Gene Name		UniProtKB Homo sapiens
OPN1SW		P03999 (http://www.uniprot.org/uniprot/P03999)
Synonyms		GenebankID or UniProtKB
BCP; BOP; CBT		AAR24539 (https://www.ncbi.nlm.nih.gov/nuccore/AAR24539)
String		
9606.ENSPP00000249389 (http://string-db.org/newstring.cgi/show_network_section.pl?identifier=9606.ENSPP00000249389)		
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>)

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

F49L, F86M, E113D - all have an effect (+ maybe V91I T93P V109A L116V S118T)

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	Phe	Leu	49

Main Reference

Genetic basis of spectral tuning in the violet-sensitive visual pigment of African clawed frog, *Xenopus laevis*. (2005) (<https://pubmed.ncbi.nlm.nih.gov/16079229>)

Authors

Takahashi Y; Yokoyama S

Abstract

Ultraviolet (UV) and violet vision in vertebrates is mediated by UV and violet visual pigments that absorb light maximally (lambda_{damax}) at approximately 360 and 390-440 nm, respectively. So far, a total of 11 amino acid sites only in transmembrane (TM) helices I-III are known to be involved in the functional differentiation of these short wavelength-sensitive type 1 (SWS1) pigments. Here, we have constructed chimeric pigments between the violet pigment of African clawed frog (*Xenopus laevis*) and its ancestral UV pigment. The results show that not only are the absorption spectra of these pigments modulated strongly by amino acids in TM I-VII, but also, for unknown reasons, the overall effect of amino acid changes in TM IV-VII on the lambda_{damax}-shift is abolished. The spectral tuning of the contemporary frog pigment is explained by amino acid replacements F86M, V91I, T93P, V109A, E113D, L116V, and S118T, in which V91I and V109A are previously unknown, increasing the total number of critical amino acid sites that are involved in the spectral tuning of SWS1 pigments in vertebrates to 13.

Additional References

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

F49L, F86M, E113D - all have an effect (+ maybe V91I T93P V109A L116V S118T)

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	Phe	Met	86

Main Reference

Genetic basis of spectral tuning in the violet-sensitive visual pigment of African clawed frog, *Xenopus laevis*. (2005) (<https://pubmed.ncbi.nlm.nih.gov/16079229>)

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Additional References

Mutation #3

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

F49L, F86M, E113D - all have an effect (+ maybe V91I T93P V109A L116V S118T)

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	Glu	Asp	113

Main Reference

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Abstract

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Additional References

RELATED GEPHE

Related Genes

3 (opsin - rhodopsin (LWS), opsin - rhodopsin1 (RH1), opsin - rhodopsin (MWS=duplicate of LWS)) (<https://www.gephebase.org/search-criteria?/or+Taxon ID=^32524^/and+Trait=Color vision/or+Taxon ID=^8355^/and+Trait=Color vision/and+groupHaplotypes=true#gephebase-summary-title>)

Related Haplotypes

13 ([https://www.gephebase.org/search-criteria?/or+Gene Gephebase=^opsin - \(SWS1\)^/and+Taxon ID=^32524^/or+Gene Gephebase=^opsin - \(SWS1\)^/and+Taxon ID=^8355^#gephebase-summary-title](https://www.gephebase.org/search-criteria?/or+Gene Gephebase=^opsin - (SWS1)^/and+Taxon ID=^32524^/or+Gene Gephebase=^opsin - (SWS1)^/and+Taxon ID=^8355^#gephebase-summary-title))

EXTERNAL LINKS

COMMENTS

@SeveralMutationsWithEffect

