

GEPHE SUMMARY

	Gephebase Gene		GepheID
opsin - rhodopsin (MWS=duplicate of LWS) (<a +opsin+rhodopsin+(mws='duplicate+of+LWS)+"#gephebase-summary-title"' href="https://www.gephebase.org/search-criteria?/and+Gene+Gephebase=">https://www.gephebase.org/search-criteria?/and+Gene+Gephebase="+opsin+rhodopsin+(MWS=duplicate+of+LWS)+"#gephebase-summary-title)		GP00000778	
	Entry Status	Courtier	Main curator
Published			

PHENOTYPIC CHANGE

	Trait Category		
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)		Trait	
Color vision (green-shift) (<a +color+vision+(green-shift)+"#gephebase-summary-title"="" href="https://www.gephebase.org/search-criteria?/and+Trait=">https://www.gephebase.org/search-criteria?/and+Trait="+Color+vision+(green-shift)+"#gephebase-summary-title)			
	Trait State in Taxon A		
Other primates		Trait State in Taxon B	
Catarrhines; Homo sapiens			
	Ancestral State		
Data not curated		Taxonomic Status	
Intergeneric or Higher (<a +intergeneric+or+higher+"#gephebase-summary-title"="" href="https://www.gephebase.org/search-criteria?/and+Taxonomic+Status=">https://www.gephebase.org/search-criteria?/and+Taxonomic+Status="+Intergeneric+or+Higher+"#gephebase-summary-title)			
	Taxon A		Taxon B
	Latin Name		Latin Name
Primates (<a +primates+"#gephebase-summary-title"="" href="https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=">https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms="+Primates+"#gephebase-summary-title)		Catarrhini (<a +catarrhini+"#gephebase-summary-title"="" href="https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=">https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms="+Catarrhini+"#gephebase-summary-title)	
-	Common Name	-	Common Name
	Synonyms	-	Synonyms
Primata; Primates Linnaeus, 1758		-	
	Rank		Rank
order		parvorder	
	Lineage		Lineage
cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Deuterostomia; Chordata; Craniata; Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Sarcopterygii; Dipnotetrapodomorpha; Tetrapoda; Amniota; Mammalia; Theria; Eutheria; Boreoeutheria; Euarchontoglires		cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Deuterostomia; Chordata; Craniata; Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Sarcopterygii; Dipnotetrapodomorpha; Tetrapoda; Amniota; Mammalia; Theria; Eutheria; Boreoeutheria; Euarchontoglires; Primates; Haplorrhini; Simiiformes	
	Parent		Parent
Euarchontoglires () - (Rank: superorder) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=314146)		Simiiformes () - (Rank: infraorder) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=314293)	
	NCBI Taxonomy ID		NCBI Taxonomy ID
9443 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=9443)		9526 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=9526)	
	is Taxon A an Intraspecies?		is Taxon B an Intraspecies?
No		No	

GENOTYPIC CHANGE

	Generic Gene Name		UniProtKB Homo sapiens
OPN1MW		P04001 (http://www.uniprot.org/uniprot/P04001)	
	Synonyms		GenebankID or UniProtKB
GCP; GOP; OPN1MW		BAB88652 (https://www.ncbi.nlm.nih.gov/nucleotide/BAB88652)	
-	String		
	Sequence Similarities		
Belongs to the G-protein coupled receptor 1 family. Opsin subfamily.			
	GO - Molecular Function		
GO:0042802 : identical protein binding (https://www.ebi.ac.uk/QuickGO/term/GO:0042802)			
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: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:0005886 : plasma membrane (<https://www.ebi.ac.uk/QuickGO/term/GO:0005886>)
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

S116Y; S180A; I230T; A233S/T; Y277F; T285A; Y309F
according to an extensive mutagenesis study including a set of 28 chimeric proteins and an additional 30 single and multiple point mutants the spectral difference between these 2 pigments is shown to be determined by 7 and only 7 amino acid residues. In going from the red pigment to the green pigment, the 7 residues are Ser 116Tyr Ser 180Ala Ile 230Thr Ala233Ser Tyr277Phe Thr285Ala and Tyr309Phe.

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	Ser	Tyr	116

Main Reference

Molecular determinants of human red/green color discrimination. (1994) (<https://pubmed.ncbi.nlm.nih.gov/8185948>)

Authors

Asenjo AB; Rim J; Oprian DD

Abstract

The human red and green color vision pigments are identical at all but 15 of their 364 amino acids, and yet their absorption maxima differ by 31 nm. In an extensive mutagenesis study, including a set of 28 chimeric proteins modeled after pigments in the color-deficient human population and an additional 30 single and multiple point mutants, the spectral difference between these 2 pigments is shown to be determined by 7 and only 7 amino acid residues. In going from the red pigment to the green pigment, the 7 residues are Ser116-->Tyr, Ser180-->Ala, Ile230-->Thr, Ala233-->Ser, Tyr277-->Phe, Thr285-->Ala, and Tyr309-->Phe.

Additional References

Molecular evolution of trichromacy in primates. (1998) (<https://pubmed.ncbi.nlm.nih.gov/9893841>)

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

S116Y; S180A; I230T; A233S/T; Y277F; T285A; Y309F
according to an extensive mutagenesis study including a set of 28 chimeric proteins and an additional 30 single and multiple point mutants the spectral difference between these 2 pigments is shown to be determined by 7 and only 7 amino acid residues. In going from the red pigment to the green pigment, the 7 residues are Ser 116Tyr Ser 180Ala Ile 230Thr Ala233Ser Tyr277Phe Thr285Ala and Tyr309Phe.

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	Ser	Ala	180
			Main Reference
Molecular determinants of human red/green color discrimination. (1994) (https://pubmed.ncbi.nlm.nih.gov/8185948)			Authors
Asenjo AB; Rim J; Oprian DD			Abstract
The human red and green color vision pigments are identical at all but 15 of their 364 amino acids, and yet their absorption maxima differ by 31 nm. In an extensive mutagenesis study, including a set of 28 chimeric proteins modeled after pigments in the color-deficient human population and an additional 30 single and multiple point mutants, the spectral difference between these 2 pigments is shown to be determined by 7 and only 7 amino acid residues. In going from the red pigment to the green pigment, the 7 residues are Ser116-->Tyr, Ser180-->Ala, Ile230-->Thr, Ala233-->Ser, Tyr277-->Phe, Thr285-->Ala, and Tyr309-->Phe.			Additional References
Molecular evolution of trichromacy in primates. (1998) (https://pubmed.ncbi.nlm.nih.gov/9893841)			

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
S116Y; S180A; I230T; A233S/T; Y277F; T285A; Y309F				
according to an extensive mutagenesis study including a set of 28 chimeric proteins and an additional 30 single and multiple point mutants the spectral difference between these 2 pigments is shown to be determined by 7 and only 7 amino acid residues. In going from the red pigment to the green pigment, the 7 residues are Ser 116Tyr Ser 180Ala Ile 230Thr Ala233Ser Tyr277Phe Thr285Ala and Tyr309Phe.				
				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	Ile	Thr		230
				Main Reference
Molecular determinants of human red/green color discrimination. (1994) (https://pubmed.ncbi.nlm.nih.gov/8185948)				
				Authors
Asenjo AB; Rim J; Oprian DD				
				Abstract
The human red and green color vision pigments are identical at all but 15 of their 364 amino acids, and yet their absorption maxima differ by 31 nm. In an extensive mutagenesis study, including a set of 28 chimeric proteins modeled after pigments in the color-deficient human population and an additional 30 single and multiple point mutants, the spectral difference between these 2 pigments is shown to be determined by 7 and only 7 amino acid residues. In going from the red pigment to the green pigment, the 7 residues are Ser116-->Tyr, Ser180-->Ala, Ile230-->Thr, Ala233-->Ser, Tyr277-->Phe, Thr285-->Ala, and Tyr309-->Phe.				
				Additional References
Molecular evolution of trichromacy in primates. (1998) (https://pubmed.ncbi.nlm.nih.gov/9893841)				

Mutation #4		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
S116Y; S180A; I230T; A233S/T; Y277F; T285A; Y309F according to an extensive mutagenesis study including a set of 28 chimeric proteins and an additional 30 single and multiple point mutants the spectral difference between these 2 pigments is shown to be determined by 7 and only 7 amino acid residues. In going from the red pigment to the green pigment, the 7 residues are Ser 116Tyr Ser 180Ala Ile 230Thr Ala233Ser Tyr277Phe Thr285Ala and Tyr309Phe.		
Candidate Gene (https://www.gephebase.org/search-criteria?/and+Experimental Evidence=^Candidate Gene^#gephebase-summary-title)		Experimental Evidence

	Taxon A	Taxon B	Position
Codon	-	-	-
Amino-acid	Ala	Ser	233
			Main Reference
Molecular determinants of human red/green color discrimination. (1994) (https://pubmed.ncbi.nlm.nih.gov/8185948)			Authors
Asenjo AB; Rim J; Oprian DD			Abstract
The human red and green color vision pigments are identical at all but 15 of their 364 amino acids, and yet their absorption maxima differ by 31 nm. In an extensive mutagenesis study, including a set of 28 chimeric proteins modeled after pigments in the color-deficient human population and an additional 30 single and multiple point mutants, the spectral difference between these 2 pigments is shown to be determined by 7 and only 7 amino acid residues. In going from the red pigment to the green pigment, the 7 residues are Ser116-->Tyr, Ser180-->Ala, Ile230-->Thr, Ala233-->Ser, Tyr277-->Phe, Thr285-->Ala, and Tyr309-->Phe.			Additional References
Molecular evolution of trichromacy in primates. (1998) (https://pubmed.ncbi.nlm.nih.gov/9893841)			

Mutation #5				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		
S116Y; S180A; I230T; A233S/T; Y277F; T285A; Y309F according to an extensive mutagenesis study including a set of 28 chimeric proteins and an additional 30 single and multiple point mutants the spectral difference between these 2 pigments is shown to be determined by 7 and only 7 amino acid residues. In going from the red pigment to the green pigment, the 7 residues are Ser 116Tyr Ser 180Ala Ile 230Thr Ala233Ser Tyr277Phe Thr285Ala and Tyr309Phe.						
Candidate Gene (https://www.gephebase.org/search-criteria?/and+Experimental Evidence=^Candidate Gene^#gephebase-summary-title)						
	Taxon A	Taxon B	Position			
Codon	-	-	-			
Amino-acid	Tyr	Phe	277			
			Main Reference			
Molecular determinants of human red/green color discrimination. (1994) (https://pubmed.ncbi.nlm.nih.gov/8185948)			Authors			
Asenjo AB; Rim J; Oprian DD			Abstract			
The human red and green color vision pigments are identical at all but 15 of their 364 amino acids, and yet their absorption maxima differ by 31 nm. In an extensive mutagenesis study, including a set of 28 chimeric proteins modeled after pigments in the color-deficient human population and an additional 30 single and multiple point mutants, the spectral difference between these 2 pigments is shown to be determined by 7 and only 7 amino acid residues. In going from the red pigment to the green pigment, the 7 residues are Ser116-->Tyr, Ser180-->Ala, Ile230-->Thr, Ala233-->Ser, Tyr277-->Phe, Thr285-->Ala, and Tyr309-->Phe.			Additional References			
Molecular evolution of trichromacy in primates. (1998) (https://pubmed.ncbi.nlm.nih.gov/9893841)						

Mutation #6		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
S116Y; S180A; I230T; A233S/T; Y277F; T285A; Y309F according to an extensive mutagenesis study including a set of 28 chimeric proteins and an additional 30 single and multiple point mutants the spectral difference between these 2 pigments is shown to be determined by 7 and only 7 amino acid residues. In going from the red pigment to the green pigment, the 7 residues are Ser 116Tyr Ser 180Ala Ile 230Thr Ala233Ser Tyr277Phe Thr285Ala and Tyr309Phe.		
Candidate Gene (https://www.gephebase.org/search-criteria?/and+Experimental Evidence=^Candidate Gene^#gephebase-summary-title)		Experimental Evidence

	Taxon A	Taxon B	Position
Codon	-	-	-
Amino-acid	Thr	Ala	285
			Main Reference
Molecular determinants of human red/green color discrimination. (1994) (https://pubmed.ncbi.nlm.nih.gov/8185948)			Authors
Asenjo AB; Rim J; Oprian DD			Abstract
The human red and green color vision pigments are identical at all but 15 of their 364 amino acids, and yet their absorption maxima differ by 31 nm. In an extensive mutagenesis study, including a set of 28 chimeric proteins modeled after pigments in the color-deficient human population and an additional 30 single and multiple point mutants, the spectral difference between these 2 pigments is shown to be determined by 7 and only 7 amino acid residues. In going from the red pigment to the green pigment, the 7 residues are Ser116-->Tyr, Ser180-->Ala, Ile230-->Thr, Ala233-->Ser, Tyr277-->Phe, Thr285-->Ala, and Tyr309-->Phe.			Additional References
Molecular evolution of trichromacy in primates. (1998) (https://pubmed.ncbi.nlm.nih.gov/9893841)			

Mutation #7			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
S116Y; S180A; I230T; A233S/T; Y277F; T285A; Y309F according to an extensive mutagenesis study including a set of 28 chimeric proteins and an additional 30 single and multiple point mutants the spectral difference between these 2 pigments is shown to be determined by 7 and only 7 amino acid residues. In going from the red pigment to the green pigment, the 7 residues are Ser 116Tyr Ser 180Ala Ile 230Thr Ala233Ser Tyr277Phe Thr285Ala and Tyr309Phe.			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	Tyr	Phe	309
			Main Reference
Molecular determinants of human red/green color discrimination. (1994) (https://pubmed.ncbi.nlm.nih.gov/8185948)			Authors
Asenjo AB; Rim J; Oprian DD			Abstract
The human red and green color vision pigments are identical at all but 15 of their 364 amino acids, and yet their absorption maxima differ by 31 nm. In an extensive mutagenesis study, including a set of 28 chimeric proteins modeled after pigments in the color-deficient human population and an additional 30 single and multiple point mutants, the spectral difference between these 2 pigments is shown to be determined by 7 and only 7 amino acid residues. In going from the red pigment to the green pigment, the 7 residues are Ser116-->Tyr, Ser180-->Ala, Ile230-->Thr, Ala233-->Ser, Tyr277-->Phe, Thr285-->Ala, and Tyr309-->Phe.			Additional References
Molecular evolution of trichromacy in primates. (1998) (https://pubmed.ncbi.nlm.nih.gov/9893841)			

RELATED GEPHE

	Related Genes
No matches found.	Related Haplotypes
No matches found.	

EXTERNAL LINKS

COMMENTS

@SeveralMutationsWithEffect