GEPHE SUMMARY

Gephebase Gene

opsin - rhodopsin1 (RH1) (https://www.gephebase.org/search-criteria?/and+Gene Gephebase=^opsin - rhodopsin1 (RH1)^#gephebase-summary-title)

GepheID

GP00000780

Entry Status

Published

Main curator

Courtier

PHENOTYPIC CHANGE

Trait Category

Physiology (https://www.gephebase.org/search-criteria?/and+Trait Category=^Physiology^#gephebase-summary-title)

Trait

Color vision (blue shift) (https://www.gephebase.org/search-criteria?/and+Trait=^Color vision (blue shift)^#gephebase-summary-title)

Trait State in Taxon A

littoral cottoid fishes; Lake Baikal

Trait State in Taxon B

abyssal cottoid fishes; Lake Baikal

Ancestral State

Data not curated

Taxonomic Status

Intergeneric or Higher (https://www.gephebase.org/search-criteria?/and+Taxonomic Status=^Intergeneric or Higher^#gephebase-summary-title)

Taxon A

Latin Name

undetermined Cottoidei 'Lake Baikal' (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=^undetermined Cottoidei 'Lake Baikal'^#gephebase-summary-title)

Common Name

-

Synonyms

Baikalian cottoid fish

Rank

species

Lineage

cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Deuterostomia; Chordata; Craniata; Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupeocephala; Euteleosteomorpha; Neoteleostei; Eurypterygia; Ctenosquamata; Acanthomorphata; Euacanthomorphacea; Percomorphaceae; Eupercaria; Perciformes; Cottioidei; unclassified Cottoidei

Parent

unclassified Cottoidei () - (Rank: no rank) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 183719)

NCBI Taxonomy ID

36479 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 36479)

is Taxon A an Infraspecies?

No

Taxon B

Latin Name

undetermined Cottoidei 'Lake Baikal' (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=^undetermined Cottoidei 'Lake Baikal'^#gephebase-summary-title)

Common Name

-

Synonyms

Baikalian cottoid fish

Rank

species

Lineage

cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Deuterostomia; Chordata; Craniata; Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupeocephala; Euteleosteomorpha; Neoteleostei; Eurypterygia; Ctenosquamata; Acanthomorphata; Euacanthomorphacea; Percomorphaceae; Eupercaria; Perciformes; Cottioidei; unclassified Cottoidei

Parent

unclassified Cottoidei () - (Rank: no rank) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 183719)

NCBI Taxonomy ID

36479 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 36479)

is Taxon B an Infraspecies?

No

GENOTYPIC CHANGE

Generic Gene Name

RHO

Synonyms

RP4; OPN2; CSNBAD1

String

9606.ENSP00000296271 (http://string-db.org/newstring_cgi/show_network_section.pl?identifier=9606.ENSP00000296271)

Sequence Similarities

Belongs to the G-protein coupled receptor 1 family. Opsin subfamily.

GO - Molecular Function

GO:0046872 : metal ion binding (https://www.ebi.ac.uk/QuickGO/term/GO:0046872)
GO:0004930 : G protein-coupled receptor activity (https://www.ebi.ac.uk/QuickGO/term/GO:0004930)
GO:0008020 : G protein-coupled photoreceptor activity (https://www.ebi.ac.uk/QuickGO/term/GO:0008020)

UniProtKB Homo sapiens

P08100 (http://www.uniprot.org/uniprot/P08100)

GenebankID or UniProtKB

()

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; 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

Spectral tuning and molecular evolution of rod visual pigments in the species flock of cottoid fish in Lake Baikal. (1996) (https://pubmed.ncbi.nlm.nih.gov/8711901)

Authors

Hunt DM; Fitzgibbon J; Slobodyanyuk SJ; Bowmaker JK

Abstract

Lake Baikal in Eastern Siberia is the deepest and one of the largest and most ancient lakes in the world. However, even in the deepest regions, oxygenation levels do not fall below 75-80% of the surface levels. This has enabled a remarkable flock of largely endemic teleost fish of the sub-order Cottoidei to colonize all depth habitats. We have previously shown that species that occupy progressively deeper habitats show a blue shift in the peak wavelength of absorbance (lambda max) of both their rod and cone visual pigments; for the rod

pigments, a number of stepwise shifts occur from about 516 nm in littoral species to about 484 nm in abyssal species. By sequencing the rod opsin gene from 11 species of Baikal cottoids that include representatives from all depth habitats, we have been able to identify four amino acid substitutions that would account for these shifts. The effect of each substitution on lambda max is approximately additive and each corresponds to a particular lineage of evolution.

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

D83N; 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

Spectral tuning and molecular evolution of rod visual pigments in the species flock of cottoid fish in Lake Baikal. (1996) (https://pubmed.ncbi.nlm.nih.gov/8711901)

Authors

Hunt DM; Fitzgibbon J; Slobodyanyuk SJ; Bowmaker JK

Abstract

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Additional References

RELATED GEPHE

Related Genes

No matches found.

Related Haplotypes

No matches found.

EXTERNAL LINKS

COMMENTS

@SeveralMutationsWithEffect