

GEPHE SUMMARY

Gephebase Gene		GepheID
opsin - rhodopsin (LWS) (https://www.gephebase.org/search-criteria?/and+Gene Gephebase="opsin - rhodopsin (LWS)"#gephebase-summary-title)		GP00000776
Entry Status		Main curator
Published		Courtier

PHENOTYPIC CHANGE

Trait Category			
Physiology (https://www.gephebase.org/search-criteria?/and+Trait Category="Physiology"#gephebase-summary-title)		Trait	
Color vision (blue shift) (<a color"="" href="https://www.gephebase.org/search-criteria?/and+Trait=">https://www.gephebase.org/search-criteria?/and+Trait="Color vision (blue shift)"#gephebase-summary-title)		Trait State in Taxon A	
Other Lake Victoria cichlids - shallow waters		Trait State in Taxon B	
Neochromis greenwoodi/omnicaeruleus - deep waters		Ancestral State	
Data not curated		Taxonomic Status	
Interspecific (https://www.gephebase.org/search-criteria?/and+Taxonomic Status="Interspecific"#gephebase-summary-title)			
Taxon A		Taxon B	
Latin Name		Latin Name	
African cichlids (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms="African cichlids"#gephebase-summary-title)		Neochromis greenwoodi (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms="Neochromis greenwoodi"#gephebase-summary-title)	
Common Name		Common Name	
-		-	
Synonyms		Synonyms	
-		Neochromis greenwoodi Seehausen & Bouton, 1998	
Rank		Rank	
no rank		species	
Lineage		Lineage	
cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Deuterostomia; Chordata; Craniata; Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupecocephala; Euteleostei; Neoteleostei; Eurypterygia; Ctenosquamata; Acanthomorpha; Euacanthomorpha; Percomorphaceae; Ovalentaria; Cichlomorphae; Cichliformes; Cichlidae		cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Deuterostomia; Chordata; Craniata; Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupecocephala; Euteleostei; Neoteleostei; Eurypterygia; Ctenosquamata; Acanthomorpha; Euacanthomorpha; Percomorphaceae; Ovalentaria; Cichlomorphae; Cichliformes; Cichlidae; African cichlids; Pseudocrenilabrinae; Haplochromini; Neochromis	
Parent		Parent	
Cichlidae (cichlids) - (Rank: family) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=8113)		Neochromis () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=51177)	
NCBI Taxonomy ID		NCBI Taxonomy ID	
319095 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=319095)		303529 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=303529)	
is Taxon A an Intraspecies?		is Taxon B an Intraspecies?	
No		No	

GENOTYPIC CHANGE

Generic Gene Name		UniProtKB Homo sapiens
OPN1LW		P04000 (http://www.uniprot.org/uniprot/P04000)
Synonyms		GenebankID or UniProtKB
RCP		ADB98081 (https://www.ncbi.nlm.nih.gov/nuccore/ADB98081)
String		
9606.ENSPO0000358967 (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>)

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

Candidate mutations are CS180A and/or I277C (human LWS/MWS numbering)

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	-	-	-

Main Reference

Divergent selection on opsins drives incipient speciation in Lake Victoria cichlids. (2006) (<https://pubmed.ncbi.nlm.nih.gov/17147472>)

Authors

Terai Y; Seehausen O; Sasaki T; Takahashi K; Mizoiri S; Sugawara T; Sato T; Watanabe M; Konijnendijk N; Mrosso HD; Tachida H; Imai H; Shichida Y; Okada N

Abstract

Divergent natural selection acting on ecological traits, which also affect mate choice, is a key element of ecological speciation theory, but has not previously been demonstrated at the molecular gene level to our knowledge. Here we demonstrate parallel evolution in two cichlid genera under strong divergent selection in a gene that affects both. Strong divergent natural selection fixed opsin proteins with different predicted light absorbance properties at opposite ends of an environmental gradient. By expressing them and measuring absorbance, we show that the reciprocal fixation adapts populations to divergent light environments. The divergent evolution of the visual system coincides with divergence in male breeding coloration, consistent with incipient ecological by-product speciation.

Additional References

RELATED GEPHE

Related Genes

3 (opsin - (SWS2B), Rx1, opsin - rhodopsin1 (RH1)) (<https://www.gephebase.org/search-criteria?/or+Taxon ID=~319095^/and+Trait=Color vision/or+Taxon ID=~303529^/and+Trait=Color vision/and+groupHaplotypes=true#gephebase-summary-title>)

Related Haplotypes

1 ([https://www.gephebase.org/search-criteria?/or+Gene Gephebase=~opsin - rhodopsin \(LWS\)^/and+Taxon ID=~319095^/or+Gene Gephebase=~opsin - rhodopsin \(LWS\)^/and+Taxon ID=~303529^#gephebase-summary-title](https://www.gephebase.org/search-criteria?/or+Gene Gephebase=~opsin - rhodopsin (LWS)^/and+Taxon ID=~319095^/or+Gene Gephebase=~opsin - rhodopsin (LWS)^/and+Taxon ID=~303529^#gephebase-summary-title))

EXTERNAL LINKS

COMMENTS

