

GEPHE SUMMARY

Gephebase Gene		GepheID	
Patched1 (Ptc1) (https://www.gephebase.org/search-criteria?/and+Gene+Gephebase=~Patched1+(Ptc1)^#gephebase-summary-title)		GP00000856	
Entry Status		Main curator	
Published		Martin	

PHENOTYPIC CHANGE

Trait Category			
Morphology (https://www.gephebase.org/search-criteria?/and+Trait+Category=~Morphology^#gephebase-summary-title)			
Trait			
Cranio-facial morphology (https://www.gephebase.org/search-criteria?/and+Trait=~Cranio-facial+morphology^#gephebase-summary-title)			
Trait State in Taxon A			
Labeotropheus trewavasae			
Trait State in Taxon B			
Metriaclima mbenjii			
Ancestral State			
Taxon A			
Taxonomic Status			
Interspecific (https://www.gephebase.org/search-criteria?/and+Taxonomic+Status=~Interspecific^#gephebase-summary-title)			
Taxon A		Taxon B	
Latin Name		Latin Name	
Labeotropheus fuelleborni (https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=~Labeotropheus+fuelleborni^#gephebase-summary-title)		Maylandia mbenjii (https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=~Maylandia+mbenjii^#gephebase-summary-title)	
Common Name		Common Name	
blue mbuna		-	
Synonyms		Synonyms	
blue mbuna; Labeotropheus fuelleborni Ahl, 1926		Maylandia mbenjii; Metriaclima mbenjii; Metriaclima mbenjii; Maylandia mbenjii (Stauffer, Bowers, Kellogg & McKaye, 1997); Metriaclima mbenjii Stauffer, Bowers, Kellogg & McKaye, 1997	
Rank		Rank	
species		species	
Lineage		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; Acanthomorpha; Euacanthomorpha; Percomorphaceae; Ovalentaria; Cichlomorphae; Cichliformes; Cichlidae; African cichlids; Pseudocrenilabrinae; Haplochromini; Labeotropheus		cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Deuterostomia; Chordata; Craniata; Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupeocephala; Euteleosteomorpha; Neoteleostei; Eurypterygia; Ctenosquamata; Acanthomorpha; Euacanthomorpha; Percomorphaceae; Ovalentaria; Cichlomorphae; Cichliformes; Cichlidae; African cichlids; Pseudocrenilabrinae; Haplochromini; Maylandia	
Parent		Parent	
Labeotropheus () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=57306)		Maylandia () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=143623)	
NCBI Taxonomy ID		NCBI Taxonomy ID	
57307 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=57307)		441518 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=441518)	
is Taxon A an Intraspecies?		is Taxon B an Intraspecies?	
No		No	

GENOTYPIC CHANGE

Generic Gene Name		UniProtKB Danio rerio	
ptc1		Q98864 (http://www.uniprot.org/uniprot/Q98864)	
Synonyms		GenebankID or UniProtKB	
ptc1		AGO03751 (https://www.ncbi.nlm.nih.gov/nuccore/AGO03751)	
String			
7955.ENSDDARP00000071771 (http://string-db.org/newstring.cgi/show_network_section.pl?identifier=7955.ENSDDARP00000071771)			
Sequence Similarities			
Belongs to the patched family.			
GO - Molecular Function			
GO:0097108 : hedgehog family protein binding (https://www.ebi.ac.uk/QuickGO/term/GO:0097108)			
GO:0008158 : hedgehog receptor activity			

(<https://www.ebi.ac.uk/QuickGO/term/GO:0008158>)
GO:0005119 : smoothened binding (<https://www.ebi.ac.uk/QuickGO/term/GO:0005119>)
GO - Biological Process

GO:0001649 : osteoblast differentiation
(<https://www.ebi.ac.uk/QuickGO/term/GO:0001649>)
GO:0010002 : cardioblast differentiation
(<https://www.ebi.ac.uk/QuickGO/term/GO:0010002>)
GO:0043010 : camera-type eye development
(<https://www.ebi.ac.uk/QuickGO/term/GO:0043010>)
GO:0045879 : negative regulation of smoothened signaling pathway
(<https://www.ebi.ac.uk/QuickGO/term/GO:0045879>)
GO:0048635 : negative regulation of muscle organ development
(<https://www.ebi.ac.uk/QuickGO/term/GO:0048635>)
GO:0009954 : proximal/distal pattern formation
(<https://www.ebi.ac.uk/QuickGO/term/GO:0009954>)
GO:0031290 : retinal ganglion cell axon guidance
(<https://www.ebi.ac.uk/QuickGO/term/GO:0031290>)
GO:0007224 : smoothened signaling pathway
(<https://www.ebi.ac.uk/QuickGO/term/GO:0007224>)

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>)

Unknown (https://www.gephebase.org/search-criteria?/and+Presumptive Null=^Unknown^#gephebase-summary-title)	Presumptive Null
	Molecular Type
	Aberration Type
Unknown (https://www.gephebase.org/search-criteria?/and+Aberration Type=^Unknown^#gephebase-summary-title)	Molecular Details of the Mutation
Uncharacterized cis-regulatory change - with ancestral Labeotropheus (LF) allele exhibiting relatively higher levels of expression	Experimental Evidence
Linkage Mapping (https://www.gephebase.org/search-criteria?/and+Experimental Evidence=^Linkage Mapping^#gephebase-summary-title)	Main Reference
Craniofacial divergence and ongoing adaptation via the hedgehog pathway. (2011) (https://pubmed.ncbi.nlm.nih.gov/21788496)	Authors
Roberts RB; Hu Y; Albertson RC; Kocher TD	Abstract

Adaptive variation in craniofacial structure contributes to resource specialization and speciation, but the genetic loci that underlie craniofacial adaptation remain unknown. Here we show that alleles of the hedgehog pathway receptor Patched1 (Ptch1) gene are responsible for adaptive variation in the shape of the lower jaw both within and among genera of Lake Malawi cichlid fish. The evolutionarily derived allele of Ptch1 reduces the length of the retroarticular (RA) process of the lower jaw, a change predicted to increase speed of jaw rotation for improved suction-feeding. The alternate allele is associated with a longer RA and a more robustly mineralized jaw, typical of species that use a biting mode of feeding. Genera with the most divergent feeding morphologies are nearly fixed for different Ptch1 alleles, whereas species with intermediate morphologies still segregate variation at Ptch1. Thus, the same alleles that help to define macroevolutionary divergence among genera also contribute to microevolutionary fine-tuning of adaptive traits within some species. Variability of craniofacial morphology mediated by Ptch1 polymorphism has likely contributed to niche partitioning and ecological speciation of these fishes.

Hedgehog signaling mediates adaptive variation in a dynamic functional system in the cichlid feeding apparatus. (2014) (https://pubmed.ncbi.nlm.nih.gov/24912175)	Additional References
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RELATED GEPHE

2 (BMP4 (uncertain), lbh (limb bud and heart homolog)) (https://www.gephebase.org/search-criteria?/or+Taxon ID=^57307^/and+Trait=Cranio-facial morphology/or+Taxon ID=^441518^/and+Trait=Cranio-facial morphology/and+groupHaplotypes=true#gephebase-summary-title)	Related Genes
No matches found.	Related Haplotypes

EXTERNAL LINKS

COMMENTS

QTL exhibited an additive mode of inheritance and accounted for 17% of the phenotypic variance in the F2 population

