GEPHE SUMMARY

Gephebase Gene

pax3a (https://www.gephebase.org/search-criteria?/and+Gene Gephebase=^pax3a^#gephebase-summary-title)

GepheID

GP00001417

Entry Status

Published

Main curator

Prigent

PHENOTYPIC CHANGE

Trait Category

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

Trait

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

Trait State in Taxon A

Labeotropheus fuelleborni with large amount of xanthophore along the flank

Trait State in Taxon B

Tropheops red cheek largely devoid of xanthophores on flank

Ancestral State

Unknown

Taxonomic Status

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

Taxon A

Latin Name

Labeotropheus fuelleborni (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=^Labeotropheus fuelleborni^#gephebase-summary-title)

Common Name

blue mbuna

Synonyms

blue mbuna; Labeotropheus fuelleborni Ahl, 1926

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; Ovalentaria; Cichlomorphae; Cichliformes; Cichlidae; African cichlids; Pseudocrenilabrinae; Haplochromini; Labeotropheus

Parent

Labeotropheus () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 57306)

NCBI Taxonomy ID

57307 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 57307)

is Taxon A an Infraspecies?

No

Taxon B

Latin Name

Tropheops sp. 'red cheek' (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=^Tropheops sp. 'red cheek'^#gephebase-summary-title)

Common Name

-

Synonyms

Tropheops redcheek

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; Ovalentaria; Cichlomorphae; Cichliformes; Cichlidae; African cichlids; Pseudocrenilabrinae; Haplochromini; Tropheops

Parent

Tropheops () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 702376)

NCBI Taxonomy ID

702379 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 702379)

is Taxon B an Infraspecies?

No

GENOTYPIC CHANGE

Generic Gene Name

pax3a

Synonyms

pax3

String

-

Sequence Similarities

-

GO - Molecular Function

GO:0043565 : sequence-specific DNA binding (https://www.ebi.ac.uk/QuickGO/term/GO:0043565)

GO - Biological Process

GO:0006355 : regulation of transcription, DNA-templated (https://www.ebi.ac.uk/QuickGO/term/GO:0006355)
GO:0001755 : neural crest cell migration (https://www.ebi.ac.uk/QuickGO/term/GO:0001755)

UniProtKB Danio rerio

Q6DHA7 (http://www.uniprot.org/uniprot/Q6DHA7)

GenebankID or UniProtKB

KM272327 (https://www.ncbi.nlm.nih.gov/nuccore/KM272327)

GO:0048066 : developmental pigmentation
(https://www.ebi.ac.uk/QuickGO/term/GO:0048066)
GO:0048484 : enteric nervous system development
(https://www.ebi.ac.uk/QuickGO/term/GO:0048484)
GO:0050936 : xanthophore differentiation
(https://www.ebi.ac.uk/QuickGO/term/GO:0050936)

GO - Cellular Component

GO:0005634 : nucleus (https://www.ebi.ac.uk/QuickGO/term/GO:0005634)

Presumptive Null

No (https://www.gephebase.org/search-criteria?/and+Presumptive Null=^No^#gephebase-summary-title)

Molecular Type

Cis-regulatory (https://www.gephebase.org/search-criteria?/and+Molecular Type=^Cis-regulatory^#gephebase-summary-title)

Aberration Type

SNP (https://www.gephebase.org/search-criteria?/and+Aberration Type=^SNP^#gephebase-summary-title)

Molecular Details of the Mutation

C>T SNP within 5UTR

Experimental Evidence

Linkage Mapping (https://www.gephebase.org/search-criteria?/and+Experimental Evidence=^Linkage Mapping^#gephebase-summary-title)

Main Reference

Genetic basis of continuous variation in the levels and modular inheritance of pigmentation in cichlid fishes. (2014) (https://pubmed.ncbi.nlm.nih.gov/25156298)

Authors

Albertson RC; Powder KE; Hu Y; Coyle KP; Roberts RB; Parsons KJ

Abstract

Variation in pigmentation type and levels is a hallmark of myriad evolutionary radiations, and biologists have long been fascinated by the factors that promote and maintain variation in coloration across populations. Here, we provide insights into the genetic basis of complex and continuous patterns of colour variation in cichlid fishes, which offer a vast diversity of pigmentation patterns that have evolved in response to both natural and sexual selection. Specifically, we crossed two divergent cichlid species to generate an F2 mapping population that exhibited extensive variation in pigmentation levels and patterns. Our experimental design is robust in that it combines traditional quantitative trait locus (QTL) analysis with population genomics, which has allowed us to move efficiently from QTL interval to candidate gene. In total, we detected 41 QTL and 13 epistatic interactions that underlie melanocyte- and xanthophore-based coloration across the fins and flanks of these fishes. We also identified 2 QTL and 1 interaction for variation in the magnitude of integration among these colour traits. This finding in particular is notable as there are marked differences both within and between species with respect to the complexity of pigmentation patterns. While certain individuals are characterized by more uniform 'integrated' colour patterns, others exhibit many more degrees of freedom with respect to the distribution of colour 'modules' across the fins and flank. Our data reveal, for the first time, a genetic basis for this difference. Finally, we implicate pax3a as a mediator of continuous variation in the levels of xanthophore-based colour along the cichlid flank.

Additional References

RELATED GEPHE

Related Genes

4 (ephrin-a4, pax3b, zeb1a, Pax7) (https://www.gephebase.org/search-criteria?/or+Taxon ID=^57307^/and+Trait=Coloration/or+Taxon ID=^702379^/and+Trait=Coloration/and+groupHaplotypes=true#gephebase-summary-title)

Related Haplotypes

No matches found.

EXTERNAL LINKS

COMMENTS