GEPHE SUMMARY

Gephebase Gene

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

Entry Status

Published

GepheID

GP00002137

Main curator

Martin

PHENOTYPIC CHANGE

Trait Category

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

Trait

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

Trait State in Taxon A

X. malinche = no "spotted caudal" trait but hybrids develop melanoma

Trait State in Taxon B

X. birchmanni with â€œspotted caudalâ€ trait = a dark blotch on the caudal fin generated by clusters of macromelanocyte cells

Ancestral State

Taxon A

Taxonomic Status

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

Taxon A

Latin Name

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

Common Name

sheepshead swordtail

Synonyms

sheepshead swordtail; Xiphophorus birchmanni Lechner & Radda, 1987

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; Atherinomorphae; Cyprinodontiformes; Cyprinodontoidei; Poeciliidae; Poeciliinae; Xiphophorus

Parent

Xiphophorus () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 8082)

NCBI Taxonomy ID

32469 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 32469)

is Taxon A an Infraspecies?

No

Taxon B

Latin Name

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

Common Name

highland swordtail

Synonyms

highland swordtail; Xiphophorus malinche Rauchenberger, Kallman & Morizot, 1990

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; Atherinomorphae; Cyprinodontiformes; Cyprinodontoidei; Poeciliidae; Poeciliinae; Xiphophorus

Parent

Xiphophorus () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 8082)

NCBI Taxonomy ID

32476 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 32476)

is Taxon B an Infraspecies?

No

GENOTYPIC CHANGE

Generic Gene Name

xmrk

Synonyms

tu

String

-

Sequence Similarities

Belongs to the protein kinase superfamily. Tyr protein kinase family. EGF receptor subfamily.

GO - Molecular Function

GO:0005524 : ATP binding (https://www.ebi.ac.uk/QuickGO/term/GO:0005524)
GO:0004714 : transmembrane receptor protein tyrosine kinase activity (https://www.ebi.ac.uk/QuickGO/term/GO:0004714)

GO - Biological Process

GO:0007169 : transmembrane receptor protein tyrosine kinase signaling pathway (https://www.ebi.ac.uk/QuickGO/term/GO:0007169)

UniProtKB Xiphophorus maculatus

P13388 (http://www.uniprot.org/uniprot/P13388)

GenebankID or UniProtKB

()

GO - Cellular Component

GO:0016021 : integral component of membrane
(https://www.ebi.ac.uk/QuickGO/term/GO:0016021)

Presumptive Null

Yes (https://www.gephebase.org/search-criteria?/and+Presumptive Null=^Yes^#gephebase-summary-title)

Molecular Type

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

Aberration Type

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

Deletion Size

unknown

Molecular Details of the Mutation

Loss of Xmrk in several Xiphophorus species

Experimental Evidence

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

Main Reference

Natural hybridization reveals incompatible alleles that cause melanoma in swordtail fish. (2020) (https://pubmed.ncbi.nlm.nih.gov/32409469)

Authors

Powell DL; GarcÃa-OlazÃibal M; Keegan M; Reilly P; Du K; DÃaz-Loyo AP; Banerjee S; Blakkan D; Reich D; Andolfatto P; Rosenthal GG; Schartl M; Schumer M

Abstract

The establishment of reproductive barriers between populations can fuel the evolution of new species. A genetic framework for this process posits that "incompatible" interactions between genes can evolve that result in reduced survival or reproduction in hybrids. However, progress has been slow in identifying individual genes that underlie hybrid incompatibilities. We used a combination of approaches to map the genes that drive the development of an incompatibility that causes melanoma in swordtail fish hybrids. One of the genes involved in this incompatibility also causes melanoma in hybrids between distantly related species. Moreover, this melanoma reduces survival in the wild, likely because of progressive degradation of the fin. This work identifies genes underlying a vertebrate hybrid incompatibility and provides a glimpse into the action of these genes in natural hybrid populations.

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Additional References

RELATED GEPHE

Related Genes

No matches found.

Related Haplotypes

No matches found.

EXTERNAL LINKS

COMMENTS

@Epistasis interaction with a second loci thought to be in cd97 gene (unknown if regulatory or coding change)