GEPHE SUMMARY

Gephebase Gene
thyroid-stimulating hormone-beta-2 (https://www.gephebase.org/search-criteria?/and+Gene Gephebase=^thyroid-stimulating hormone-beta-2^#gephebase-summary-title)

GepheID
GP00001288

Entry Status
Published

Main curator
Arnoult

PHENOTYPIC CHANGE

Trait #1

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

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

Trait State in Taxon A
Gasterosteus aculeatus (marine)

Trait State in Taxon B
Gasterosteus aculeatus (freshwater) - low TH

Trait #2

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

Trait
Thyroid Hormone (plasma concentration) (https://www.gephebase.org/search-criteria?/and+Trait=^Thyroid Hormone (plasma concentration)^#gephebase-summary-title)

Trait State in Taxon A
-

Trait State in Taxon B
-

Ancestral State
Taxon A

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

Taxon A

Latin Name
Gasterosteus aculeatus (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=^Gasterosteus aculeatus^#gephebase-summary-title)

Common Name
three-spined stickleback

Synonyms
three-spined stickleback; three spined stickleback; Gasterosteus aculeatus Linnaeus, 1758

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; Gasterosteales; Gasterosteidae; Gasterosteus

Parent
Gasterosteus () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 69292)

NCBI Taxonomy ID
69293 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 69293)

is Taxon A an Infraspecies?
Yes

Taxon A Description
Gasterosteus aculeatus (marine)

Taxon B

Latin Name
Gasterosteus aculeatus (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=^Gasterosteus aculeatus^#gephebase-summary-title)

Common Name
three-spined stickleback

Synonyms
three-spined stickleback; three spined stickleback; Gasterosteus aculeatus Linnaeus, 1758

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; Gasterosteales; Gasterosteidae; Gasterosteus

Parent
Gasterosteus () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 69292)

NCBI Taxonomy ID
69293 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 69293)

is Taxon B an Infraspecies?
Yes

Taxon B Description
Gasterosteus aculeatus (freshwater) - low TH

GENOTYPIC CHANGE

Generic Gene Name

tshba

UniProtKB Danio rerio

B3DJU0 (http://www.uniprot.org/uniprot/B3DJU0)

Synonyms

tshb

GenebankID or UniProtKB

()

String

7955.ENSDARP00000108432 (http://string-db.org/newstring_cgi/show_network_section.pl?identifier=7955.ENSDARP00000108432)

Sequence Similarities

Belongs to the glycoprotein hormones subunit beta family.

GO - Molecular Function

GO:0005179 : hormone activity (https://www.ebi.ac.uk/QuickGO/term/GO:0005179)

GO - Biological Process

GO:0009755 : hormone-mediated signaling pathway (https://www.ebi.ac.uk/QuickGO/term/GO:0009755)

GO - Cellular Component

GO:0005737 : cytoplasm (https://www.ebi.ac.uk/QuickGO/term/GO:0005737)
GO:0005615 : extracellular space (https://www.ebi.ac.uk/QuickGO/term/GO:0005615)

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

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

Molecular Details of the Mutation

unknown

Experimental Evidence

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

Main Reference

Adaptive divergence in the thyroid hormone signaling pathway in the stickleback radiation. (2010) (https://pubmed.ncbi.nlm.nih.gov/21093265)

Authors

Kitano J; Lema SC; Luckenbach JA; Mori S; Kawagishi Y; Kusakabe M; Swanson P; Peichel CL

Abstract

During adaptive radiations, animals colonize diverse environments, which requires adaptation in multiple phenotypic traits. Because hormones mediate the dynamic regulation of suites of phenotypic traits, evolutionary changes in hormonal signaling pathways might contribute to adaptation to new environments. Here we report changes in the thyroid hormone signaling pathway in stream-resident ecotypes of threespine stickleback fish (Gasterosteus aculeatus), which have repeatedly evolved from ancestral marine ecotypes. Stream-resident fish exhibit a lower plasma concentration of thyroid hormone and a lower metabolic rate, which is likely adaptive for permanent residency in small streams. The thyroid-stimulating hormone-Î²2 (TSHÎ²2) gene exhibited significantly lower mRNA expression in pituitary glands of stream-resident sticklebacks relative to marine sticklebacks. Some of the difference in TSHÎ²2 transcript levels can be explained by cis-regulatory differences at the TSHÎ²2 gene locus. Consistent with these expression differences, a strong signature of divergent natural selection was found at the TSHÎ²2 genomic locus. By contrast, there were no differences between the marine and stream-resident ecotypes in mRNA levels or genomic sequence in the paralogous TSHÎ²1 gene. Our data indicate that evolutionary changes in hormonal signaling have played an important role in the postglacial adaptive radiation of sticklebacks.

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Additional References

RELATED GEPHE

Related Genes

No matches found.

Related Haplotypes

No matches found.

EXTERNAL LINKS

COMMENTS

The marine ecotype has significantly higher levels of TSHb2 mRNA than the stream- resident ecotype