

GEPHE SUMMARY

<p>Gephebase Gene thyroid-stimulating hormone-beta-2 (<a href="https://www.gephebase.org/search-criteria?/and+Gene+Gephebase+^thyroid-stimulating+hormone-beta-2^#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Gene+Gephebase+^thyroid-stimulating+hormone-beta-2^#gephebase-summary-title</a>)</p> <p>Published</p>	<p>Entry Status Arnoult</p>	<p>GepheID GP00001288</p> <p>Main curator</p>
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PHENOTYPIC CHANGE

Trait #1	Trait Category
Physiology ( <a href="https://www.gephebase.org/search-criteria?/and+Trait+Category+^Physiology^#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Trait+Category+^Physiology^#gephebase-summary-title</a> )	
Metabolic rate ( <a href="https://www.gephebase.org/search-criteria?/and+Trait+^Metabolic+rate^#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Trait+^Metabolic+rate^#gephebase-summary-title</a> )	Trait
Gasterosteus aculeatus (marine)	Trait State in Taxon A
Gasterosteus aculeatus (freshwater) - low TH	Trait State in Taxon B

Trait #2	Trait Category
Physiology ( <a href="https://www.gephebase.org/search-criteria?/and+Trait+Category+^Physiology^#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Trait+Category+^Physiology^#gephebase-summary-title</a> )	
Thyroid Hormone (plasma concentration) ( <a href="https://www.gephebase.org/search-criteria?/and+Trait+^Thyroid+Hormone+(plasma+concentration)^#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Trait+^Thyroid+Hormone+(plasma+concentration)^#gephebase-summary-title</a> )	Trait
-	Trait State in Taxon A
-	Trait State in Taxon B

Taxon A	Ancestral State
Intraspecific ( <a href="https://www.gephebase.org/search-criteria?/and+Taxonomic+Status+^Intraspecific^#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Taxonomic+Status+^Intraspecific^#gephebase-summary-title</a> )	Taxonomic Status

Taxon A	Taxon B
Gasterosteus aculeatus ( <a href="https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms+^Gasterosteus+aculeatus^#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms+^Gasterosteus+aculeatus^#gephebase-summary-title</a> )	Gasterosteus aculeatus ( <a href="https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms+^Gasterosteus+aculeatus^#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms+^Gasterosteus+aculeatus^#gephebase-summary-title</a> )
three-spined stickleback	three-spined stickleback
three-spined stickleback; three spined stickleback; Gasterosteus aculeatus Linnaeus, 1758	three-spined stickleback; three spined stickleback; Gasterosteus aculeatus Linnaeus, 1758
species	species
cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Deuterostomia; Chordata; Craniata; Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupeocephala; Euteleostomorpha; Neoteleostei; Eurypterygia; Ctenosquamata; Acanthomorpha; Euacanthomorpha; Percomorphaceae; Eupercaria; Perciformes; Cottioidei; Gasterosteales; Gasterosteidae; Gasterosteus	cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Deuterostomia; Chordata; Craniata; Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupeocephala; Euteleostomorpha; Neoteleostei; Eurypterygia; Ctenosquamata; Acanthomorpha; Euacanthomorpha; Percomorphaceae; Eupercaria; Perciformes; Cottioidei; Gasterosteales; Gasterosteidae; Gasterosteus
Gasterosteus () - (Rank: genus) ( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=69292">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=69292</a> )	Gasterosteus () - (Rank: genus) ( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=69292">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=69292</a> )
69293 ( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=69293">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=69293</a> )	69293 ( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=69293">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=69293</a> )
is Taxon A an Intraspecies?	is Taxon B an Intraspecies?
Yes	Yes
Gasterosteus aculeatus (marine)	Gasterosteus aculeatus (freshwater) - low TH

Taxon A	Taxon B
Gasterosteus aculeatus ( <a href="https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms+^Gasterosteus+aculeatus^#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms+^Gasterosteus+aculeatus^#gephebase-summary-title</a> )	Gasterosteus aculeatus ( <a href="https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms+^Gasterosteus+aculeatus^#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms+^Gasterosteus+aculeatus^#gephebase-summary-title</a> )
three-spined stickleback	three-spined stickleback
three-spined stickleback; three spined stickleback; Gasterosteus aculeatus Linnaeus, 1758	three-spined stickleback; three spined stickleback; Gasterosteus aculeatus Linnaeus, 1758
species	species
cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Deuterostomia; Chordata; Craniata; Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupeocephala; Euteleostomorpha; Neoteleostei; Eurypterygia; Ctenosquamata; Acanthomorpha; Euacanthomorpha; Percomorphaceae; Eupercaria; Perciformes; Cottioidei; Gasterosteales; Gasterosteidae; Gasterosteus	cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Deuterostomia; Chordata; Craniata; Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupeocephala; Euteleostomorpha; Neoteleostei; Eurypterygia; Ctenosquamata; Acanthomorpha; Euacanthomorpha; Percomorphaceae; Eupercaria; Perciformes; Cottioidei; Gasterosteales; Gasterosteidae; Gasterosteus
Gasterosteus () - (Rank: genus) ( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=69292">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=69292</a> )	Gasterosteus () - (Rank: genus) ( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=69292">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=69292</a> )
69293 ( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=69293">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=69293</a> )	69293 ( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=69293">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=69293</a> )
is Taxon A an Intraspecies?	is Taxon B an Intraspecies?
Yes	Yes
Gasterosteus aculeatus (marine)	Gasterosteus aculeatus (freshwater) - low TH

## GENOTYPIC CHANGE

tshba	Generic Gene Name	B3DJU0 ( <a href="http://www.uniprot.org/uniprot/B3DJU0">http://www.uniprot.org/uniprot/B3DJU0</a> )	UniProtKB Danio rerio
tshb	Synonyms	0	GenebankID or UniProtKB
7955.ENSDDARP00000108432 ( <a href="http://string-db.org/newstring.cgi/show_network_section.pl?identifier=7955.ENSDDARP00000108432">http://string-db.org/newstring.cgi/show_network_section.pl?identifier=7955.ENSDDARP00000108432</a> )	String		
Belongs to the glycoprotein hormones subunit beta family.	Sequence Similarities		
GO:0005179 : hormone activity ( <a href="https://www.ebi.ac.uk/QuickGO/term/GO:0005179">https://www.ebi.ac.uk/QuickGO/term/GO:0005179</a> )	GO - Molecular Function		
GO:0009755 : hormone-mediated signaling pathway ( <a href="https://www.ebi.ac.uk/QuickGO/term/GO:0009755">https://www.ebi.ac.uk/QuickGO/term/GO:0009755</a> )	GO - Biological Process		
GO:0005737 : cytoplasm ( <a href="https://www.ebi.ac.uk/QuickGO/term/GO:0005737">https://www.ebi.ac.uk/QuickGO/term/GO:0005737</a> )	GO - Cellular Component		
GO:0005615 : extracellular space ( <a href="https://www.ebi.ac.uk/QuickGO/term/GO:0005615">https://www.ebi.ac.uk/QuickGO/term/GO:0005615</a> )			
No ( <a href="https://www.gephebase.org/search-criteria?/and+Presumptive Null=^No^#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Presumptive Null=^No^#gephebase-summary-title</a> )			Presumptive Null
Cis-regulatory ( <a href="https://www.gephebase.org/search-criteria?/and+Molecular Type=^Cis-regulatory^#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Molecular Type=^Cis-regulatory^#gephebase-summary-title</a> )			Molecular Type
Unknown ( <a href="https://www.gephebase.org/search-criteria?/and+Aberration Type=^Unknown^#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Aberration Type=^Unknown^#gephebase-summary-title</a> )			Aberration Type
unknown			Molecular Details of the Mutation
Candidate Gene ( <a href="https://www.gephebase.org/search-criteria?/and+Experimental Evidence=^Candidate Gene^#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Experimental Evidence=^Candidate Gene^#gephebase-summary-title</a> )			Experimental Evidence
Adaptive divergence in the thyroid hormone signaling pathway in the stickleback radiation. (2010) ( <a href="https://pubmed.ncbi.nlm.nih.gov/21093265">https://pubmed.ncbi.nlm.nih.gov/21093265</a> )			Main Reference
Kitano J; Lema SC; Luckenbach JA; Mori S; Kawagishi Y; Kusakabe M; Swanson P; Peichel CL			Authors
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 ( <i>Gasterosteus aculeatus</i> ), 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- $\hat{I}^2$ (TSH $\hat{I}^2$ ) gene exhibited significantly lower mRNA expression in pituitary glands of stream-resident sticklebacks relative to marine sticklebacks. Some of the difference in TSH $\hat{I}^2$ transcript levels can be explained by cis-regulatory differences at the TSH $\hat{I}^2$ gene locus. Consistent with these expression differences, a strong signature of divergent natural selection was found at the TSH $\hat{I}^2$ genomic locus. By contrast, there were no differences between the marine and stream-resident ecotypes in mRNA levels or genomic sequence in the paralogous TSH $\hat{I}^1$ gene. Our data indicate that evolutionary changes in hormonal signaling have played an important role in the postglacial adaptive radiation of sticklebacks.			Abstract
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## RELATED GEPHE

No matches found.	Related Genes
No matches found.	Related Haplotypes

## EXTERNAL LINKS

## COMMENTS

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

