

GEPHE SUMMARY

	Gephebase Gene	GepheID
Ectodysplasin (EDA) (https://www.gephebase.org/search-criteria?/and+Gene Gephebase="Ectodysplasin (EDA)"#gephebase-summary-title)	GP00000254	
	Entry Status	Martin
Published		Main curator

PHENOTYPIC CHANGE

	Trait Category		
Morphology (https://www.gephebase.org/search-criteria?/and+Trait Category="Morphology"#gephebase-summary-title)			
	Trait		
Dermal bone (loss of armor plates) (<a (loss="" armor="" bone="" dermal="" href="https://www.gephebase.org/search-criteria?/and+Trait=" of="" plates)"#gephebase-summary-title"="">https://www.gephebase.org/search-criteria?/and+Trait="Dermal bone (loss of armor plates)"#gephebase-summary-title)			
	Trait State in Taxon A		
Gasterosteus aculeatus (marine)			
	Trait State in Taxon B		
Gasterosteus aculeatus (freshwater)			
	Ancestral State		
Taxon A			
	Taxonomic Status		
Interspecific (https://www.gephebase.org/search-criteria?/and+Taxonomic Status="Interspecific"#gephebase-summary-title)			
		Taxon B	
	Latin Name		Latin Name
Gasterosteus aculeatus (<a aculeatus"#gephebase-summary-title"="" gasterosteus="" href="https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=">https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms="Gasterosteus aculeatus"#gephebase-summary-title)		Gasterosteus aculeatus (<a aculeatus"#gephebase-summary-title"="" gasterosteus="" href="https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=">https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms="Gasterosteus aculeatus"#gephebase-summary-title)	
	Common Name		Common Name
three-spined stickleback		three-spined stickleback	
	Synonyms		Synonyms
three-spined stickleback; three spined stickleback; Gasterosteus aculeatus Linnaeus, 1758		three-spined stickleback; three spined stickleback; Gasterosteus aculeatus Linnaeus, 1758	
	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; Acanthomorphata; Euacanthomorphacea; 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; Euteleosteomorpha; Neoteleostei; Eurypterygia; Ctenosquamata; Acanthomorphata; Euacanthomorphacea; Percomorphaceae; Eupercaria; Perciformes; Cottioidei; Gasterosteales; Gasterosteidae; Gasterosteus	
	Parent		Parent
Gasterosteus () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 69292)		Gasterosteus () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 69292)	
	NCBI Taxonomy ID		NCBI Taxonomy ID
69293 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 69293)		69293 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 69293)	
	is Taxon A an Intraspecies?		is Taxon B an Intraspecies?
No		Yes	
			Taxon B Description
		Gasterosteus aculeatus (freshwater)	

GENOTYPIC CHANGE

	Generic Gene Name	UniProtKB Mus musculus
Eda		O54693 (http://www.uniprot.org/uniprot/O54693)
	Synonyms	GenebankID or UniProtKB
Ta; Ed1; HED; EDA1; XLHED; tabby; Eda-A1; Eda-A2; Tnlg7c		AAAY27076 (https://www.ncbi.nlm.nih.gov/nuccore/AAAY27076)
	String	
10090.ENSMUSP00000109409 (http://string-db.org/newstring.cgi/show_network_section.pl?identifier=10090.ENSMUSP00000109409)		
	Sequence Similarities	
Belongs to the tumor necrosis factor family.		
	GO - Molecular Function	
GO:0038177 : death receptor agonist activity (https://www.ebi.ac.uk/QuickGO/term/GO:0038177)		
GO:0005123 : death receptor binding		

(<https://www.ebi.ac.uk/QuickGO/term/GO:0005123>)
GO:0005164 : tumor necrosis factor receptor binding
(<https://www.ebi.ac.uk/QuickGO/term/GO:0005164>)

GO - Biological Process

GO:0006955 : immune response (<https://www.ebi.ac.uk/QuickGO/term/GO:0006955>)
GO:0030154 : cell differentiation (<https://www.ebi.ac.uk/QuickGO/term/GO:0030154>)
GO:0043473 : pigmentation (<https://www.ebi.ac.uk/QuickGO/term/GO:0043473>)
GO:0010628 : positive regulation of gene expression
(<https://www.ebi.ac.uk/QuickGO/term/GO:0010628>)
GO:0051092 : positive regulation of NF-kappaB transcription factor activity
(<https://www.ebi.ac.uk/QuickGO/term/GO:0051092>)
GO:0019221 : cytokine-mediated signaling pathway
(<https://www.ebi.ac.uk/QuickGO/term/GO:0019221>)
GO:0007160 : cell-matrix adhesion (<https://www.ebi.ac.uk/QuickGO/term/GO:0007160>)
GO:0010467 : gene expression (<https://www.ebi.ac.uk/QuickGO/term/GO:0010467>)
GO:0001942 : hair follicle development
(<https://www.ebi.ac.uk/QuickGO/term/GO:0001942>)
GO:0060789 : hair follicle placode formation
(<https://www.ebi.ac.uk/QuickGO/term/GO:0060789>)
GO:0042475 : odontogenesis of dentin-containing tooth
(<https://www.ebi.ac.uk/QuickGO/term/GO:0042475>)
GO:0090263 : positive regulation of canonical Wnt signaling pathway
(<https://www.ebi.ac.uk/QuickGO/term/GO:0090263>)
GO:0043123 : positive regulation of I-kappaB kinase/NF-kappaB signaling
(<https://www.ebi.ac.uk/QuickGO/term/GO:0043123>)
GO:1901224 : positive regulation of NIK/NF-kappaB signaling
(<https://www.ebi.ac.uk/QuickGO/term/GO:1901224>)
GO:1901222 : regulation of NIK/NF-kappaB signaling
(<https://www.ebi.ac.uk/QuickGO/term/GO:1901222>)
GO:0060662 : salivary gland cavitation
(<https://www.ebi.ac.uk/QuickGO/term/GO:0060662>)
GO:0043588 : skin development (<https://www.ebi.ac.uk/QuickGO/term/GO:0043588>)
GO:0061153 : trachea gland development
(<https://www.ebi.ac.uk/QuickGO/term/GO:0061153>)

GO - Cellular Component

GO:0005887 : integral component of plasma membrane
(<https://www.ebi.ac.uk/QuickGO/term/GO:0005887>)
GO:0005576 : extracellular region (<https://www.ebi.ac.uk/QuickGO/term/GO:0005576>)
GO:0005789 : endoplasmic reticulum membrane
(<https://www.ebi.ac.uk/QuickGO/term/GO:0005789>)
GO:0045177 : apical part of cell (<https://www.ebi.ac.uk/QuickGO/term/GO:0045177>)
GO:0005581 : collagen trimer (<https://www.ebi.ac.uk/QuickGO/term/GO:0005581>)
GO:0005811 : lipid droplet (<https://www.ebi.ac.uk/QuickGO/term/GO:0005811>)

	Presumptive Null
Unknown (https://www.gephebase.org/search-criteria?/and+Presumptive Null=~Unknown~#gephebase-summary-title)	
Cis-regulatory (https://www.gephebase.org/search-criteria?/and+Molecular Type=~Cis-regulatory~#gephebase-summary-title)	Molecular Type
	Aberration Type
Unknown (https://www.gephebase.org/search-criteria?/and+Aberration Type=~Unknown~#gephebase-summary-title)	
	Molecular Details of the Mutation
large haplotype- includes a T-> G regulatory change that affect expression based on differential responsiveness to Wnt signaling	
	Experimental Evidence
Linkage Mapping (https://www.gephebase.org/search-criteria?/and+Experimental Evidence=~Linkage Mapping~#gephebase-summary-title)	
	Main Reference
Widespread parallel evolution in sticklebacks by repeated fixation of Ectodysplasin alleles. (2005) (https://pubmed.ncbi.nlm.nih.gov/15790847)	
	Authors
Colosimo PF; Hosemann KE; Balabhadra S; Villarreal G; Dickson M; Grimwood J; Schmutz J; Myers RM; Schluter D; Kingsley DM	
	Abstract
Major phenotypic changes evolve in parallel in nature by molecular mechanisms that are largely unknown. Here, we use positional cloning methods to identify the major chromosome locus controlling armor plate patterning in wild threespine sticklebacks. Mapping, sequencing, and transgenic studies show that the Ectodysplasin (EDA) signaling pathway plays a key role in evolutionary change in natural populations and that parallel evolution of stickleback low-plated phenotypes at most freshwater locations around the world has occurred by repeated selection of Eda alleles derived from an ancestral low-plated haplotype that first appeared more than two million years ago. Members of this clade of low-plated alleles are present at low frequencies in marine fish, which suggests that standing genetic variation can provide a molecular basis for rapid, parallel evolution of dramatic phenotypic change in nature.	
	Additional References
The genomic basis of adaptive evolution in threespine sticklebacks. (2012) (https://pubmed.ncbi.nlm.nih.gov/22481358)	
A recurrent regulatory change underlying altered expression and Wnt response of the stickleback armor plates gene EDA. (2015) (https://pubmed.ncbi.nlm.nih.gov/25629660)	

RELATED GEPHE

	Related Genes
1 (GDF6) (https://www.gephebase.org/search-criteria?/or+Taxon ID=~69293~/and+Trait=Dermal bone/and+groupHaplotypes=true#gephebase-summary-title)	
No matches found.	Related Haplotypes

EXTERNAL LINKS

COMMENTS

Functional validation: comparison of enhancer reporter assays with T/C polymorphism. Behavioral phenotype in schooling ability verified in CMV:EDA transgenic fish