

GEPHE SUMMARY

edn3b (https://www.gephebase.org/search-criteria?/and+Gene+Gephebase+^edn3b^#gephebase-summary-title)	Gephebase Gene	GP00002124	GepheID
Published	Entry Status	Santos	Main curator

PHENOTYPIC CHANGE

Morphology (https://www.gephebase.org/search-criteria?/and+Trait+Category+^Morphology+^#gephebase-summary-title)	Trait Category		
Coloration (reduced number of stripes) (https://www.gephebase.org/search-criteria?/and+Trait+^Coloration+(reduced+number+of+stripes)+^#gephebase-summary-title)	Trait		
several dark stripes and light interstripes	Trait State in Taxon A		
fewer stripes and interstripes overall with spots forming ventrally instead of stripes	Trait State in Taxon B		
Unknown	Ancestral State		
Interspecific (https://www.gephebase.org/search-criteria?/and+Taxonomic+Status+^Interspecific+^#gephebase-summary-title)	Taxonomic Status		
	Taxon A		Taxon B
Danio rerio (https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms+^Danio+rerio+^#gephebase-summary-title)	Latin Name	Danio nigrofasciatus (https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms+^Danio+nigrofasciatus+^#gephebase-summary-title)	Latin Name
zebrafish	Common Name	dwarf danio	Common Name
Brachydanio rerio; Brachydanio rerio frankei; Cyprinus rerio; Danio frankei; Danio rerio frankei; zebrafish; leopard danio; zebra danio; zebra fish; Cyprinus rerio Hamilton, 1822; Danio rerio (Hamilton, 1822); Brachidanio rerio	Synonyms	dwarf danio; Danio nigrofasciatus (Day, 1870)	Synonyms
species	Rank	species	Rank
cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Deuterostomia; Chordata; Craniata; Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupeocephala; Otomorpha; Ostariophysi; Otophysi; Cypriniphysae; Cypriniformes; Cyprinoidei; Cyprinidae; Danio	Lineage	cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Deuterostomia; Chordata; Craniata; Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupeocephala; Otomorpha; Ostariophysi; Otophysi; Cypriniphysae; Cypriniformes; Cyprinoidei; Cyprinidae; Danio	Lineage
Danio () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=7954)	Parent	Danio () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=7954)	Parent
7955 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=7955)	NCBI Taxonomy ID	144739 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=144739)	NCBI Taxonomy ID
No	is Taxon A an Intraspecies?	No	is Taxon B an Intraspecies?

GENOTYPIC CHANGE

edn3b	Generic Gene Name	E9QFS0 (http://www.uniprot.org/uniprot/E9QFS0)	UniProtKB Danio rerio
edn3; si:dkey-211h10.1; EDN3	Synonyms	0	GenebankID or UniProtKB
7955.ENS DARP00000115695 (http://string-db.org/newstring.cgi/show_network_section.pl?identifier=7955.ENS DARP00000115695)	String		
-	Sequence Similarities		
-	GO - Molecular Function		
-	GO - Biological Process		
GO:0030318 : melanocyte differentiation (https://www.ebi.ac.uk/QuickGO/term/GO:0030318)			
GO:0019229 : regulation of vasoconstriction			

(<https://www.ebi.ac.uk/QuickGO/term/GO:0019229>)

GO:0070285 : pigment cell development

(<https://www.ebi.ac.uk/QuickGO/term/GO:0070285>)

GO - Cellular Component

GO:0005576 : extracellular region (<https://www.ebi.ac.uk/QuickGO/term/GO:0005576>)

Presumptive Null

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

Molecular Type

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

Aberration Type

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

Molecular Details of the Mutation

pigment pattern differences between these species are clearly polygenic, and it seems likely that additional loci, of the endothelin pathway or other pathways, will be identified as contributing to attenuated stripes and interstripes of *D. nigrofasciatus* compared to *D. rerio*.

Experimental Evidence

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

Main Reference

Evolution of Endothelin signaling and diversification of adult pigment pattern in Danio fishes. (2018) (<https://pubmed.ncbi.nlm.nih.gov/30226839>)

Authors

Spiewak JE; Bain EJ; Liu J; Kou K; Sturiale SL; Patterson LB; Diba P; Eisen JS; Braasch I; Ganz J; Parichy DM

Abstract

Fishes of the genus *Danio* exhibit diverse pigment patterns that serve as useful models for understanding the genes and cell behaviors underlying the evolution of adult form. Among these species, zebrafish *D. rerio* exhibit several dark stripes of melanophores with sparse iridophores that alternate with light interstripes of dense iridophores and xanthophores. By contrast, the closely related species *D. nigrofasciatus* has an attenuated pattern with fewer melanophores, stripes and interstripes. Here we demonstrate species differences in iridophore development that presage the fully formed patterns. Using genetic and transgenic approaches we identify the secreted peptide Endothelin-3 (Edn3)-a known melanogenic factor of tetrapods-as contributing to reduced iridophore proliferation and fewer stripes and interstripes in *D. nigrofasciatus*. We further show the locus encoding this factor is expressed at lower levels in *D. nigrofasciatus* owing to cis-regulatory differences between species. Finally, we show that functions of two paralogous loci encoding Edn3 have been partitioned between skin and non-skin iridophores. Our findings reveal genetic and cellular mechanisms contributing to pattern differences between these species and suggest a model for evolutionary changes in Edn3 requirements for pigment patterning and its diversification across vertebrates.

Additional References

RELATED GEPHE

Related Genes

2 (csf1a, Kcnj13) ([https://www.gephebase.org/search-criteria?/or+Taxon ID="+7955^/and+Trait=Coloration/or+Taxon ID="+144739^/and+Trait=Coloration/and+groupHaplotypes=true#gephebase-summary-title](https://www.gephebase.org/search-criteria?/or+Taxon+ID=))

Related Haplotypes

No matches found.

EXTERNAL LINKS

COMMENTS