

GEPHE SUMMARY

	Gephebase Gene	GephelD
Optix (https://www.gephebase.org/search-criteria/?and+Gene Gephebase="Optix">#gephebase-summary-title)	GP00000798	
	Entry Status	Main curator
Published	Martin	

PHENOTYPIC CHANGE

	Trait Category	
Morphology (https://www.gephebase.org/search-criteria/?and+Trait Category="Morphology">#gephebase-summary-title)	Trait	
Coloration (wing, Mullerian mimicry) (https://www.gephebase.org/search-criteria/?and+Trait=^Coloration+(wing,+Mullerian+mimicry)^#gephebase-summary-title)	Trait State in Taxon A	
Heliconius melpomene -Postman	Trait State in Taxon B	
Heliconius melpomene - rayed	Ancestral State	
Data not curated	Taxonomic Status	
Intraspecific (https://www.gephebase.org/search-criteria/?and+Taxonomic Status="Intraspecific">#gephebase-summary-title)		
Taxon A		Taxon B
	Latin Name	Latin Name
Heliconius melpomene (#gephebase-summary-title">https://www.gephebase.org/search-criteria/?and+Taxon+and+Synonyms=^Heliconius+melpomene">#gephebase-summary-title)		Heliconius melpomene (#gephebase-summary-title">https://www.gephebase.org/search-criteria/?and+Taxon+and+Synonyms=^Heliconius+melpomene">#gephebase-summary-title)
postman butterfly	Common Name	Common Name
postman butterfly; common postman; Heliconius melpomene (Linnaeus, 1758)	Synonyms	Synonyms
species	Rank	Rank
cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Protostomia; Ecdysozoa; Panarthropoda; Arthropoda; Mandibulata; Pancrustacea; Hexapoda; Insecta; Dicondylia; Pterygota; Neoptera; Holometabola; Amphiesmenoptera; Lepidoptera; Glossata; Neolepidoptera; Heteroneura; Ditrysia; Obtectomera; Papilionoidea; Nymphalidae; Heliconiinae; Heliconiini; Heliconius	Lineage	Lineage
Heliconius () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=33416)	Parent	Parent
34740 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=34740)	NCBI Taxonomy ID	NCBI Taxonomy ID
Yes	is Taxon A an Infraspecies?	is Taxon B an Infraspecies?
Heliconius melpomene -Postman	Taxon A Description	Taxon B Description

GENOTYPIC CHANGE

	Generic Gene Name	UniProtKB Drosophila melanogaster
Optix	Synonyms	GenebankID or UniProtKB
anon-WO153538.79; CG18455; D-Six3; Dmel\CG18455; Dsix3; opt; optix; OPTIX; opx; six3; Six3		AEO13434 (https://www.ncbi.nlm.nih.gov/nuccore/AEO13434)
7227.FBpp0302920 (http://string-db.org/newstring_cgi/show_network_section.pl?identifier=7227.FBpp0302920)	String	
Belongs to the SIX/Sine oculis homeobox family.	Sequence Similarities	
GO:0043565 : sequence-specific DNA binding (https://www.ebi.ac.uk/QuickGO/term/GO:0043565)	GO - Molecular Function	
GO:0001205 : distal enhancer DNA-binding transcription activator activity, RNA		

polymerase II-specific (<https://www.ebi.ac.uk/QuickGO/term/GO:0001205>)
GO:0000976 : transcription regulatory region sequence-specific DNA binding
(<https://www.ebi.ac.uk/QuickGO/term/GO:0000976>)

GO - Biological Process

GO:0045892 : negative regulation of transcription, DNA-templated
(<https://www.ebi.ac.uk/QuickGO/term/GO:0045892>)
GO:0048749 : compound eye development
(<https://www.ebi.ac.uk/QuickGO/term/GO:0048749>)
GO:0001751 : compound eye photoreceptor cell differentiation
(<https://www.ebi.ac.uk/QuickGO/term/GO:0001751>)
GO:0048856 : anatomical structure development
(<https://www.ebi.ac.uk/QuickGO/term/GO:0048856>)
GO:0001745 : compound eye morphogenesis
(<https://www.ebi.ac.uk/QuickGO/term/GO:0001745>)
GO:0048813 : dendrite morphogenesis
(<https://www.ebi.ac.uk/QuickGO/term/GO:0048813>)
GO:0007458 : progression of morphogenetic furrow involved in compound eye morphogenesis (<https://www.ebi.ac.uk/QuickGO/term/GO:0007458>)

GO - Cellular Component

GO:0005634 : nucleus (<https://www.ebi.ac.uk/QuickGO/term/GO:0005634>)
GO:0005667 : transcription factor complex
(<https://www.ebi.ac.uk/QuickGO/term/GO:0005667>)

Presumptive Null

Unknown (<https://www.gephebase.org/search-criteria?/and+Presumptive+Null=^Unknown^#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

Not identified

Experimental Evidence

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

Main Reference

optix drives the repeated convergent evolution of butterfly wing pattern mimicry. (2011) (<https://pubmed.ncbi.nlm.nih.gov/21778360>)

Authors

Reed RD; Papa R; Martin A; Hines HM; Counterman BA; Pardo-Diaz C; Jiggins CD; Chamberlain NL; Kronforst MR; Chen R; Halder G; Nijhout HF; McMillan WO

Abstract

Mimicry--whereby warning signals in different species evolve to look similar--has long served as a paradigm of convergent evolution. Little is known, however, about the genes that underlie the evolution of mimetic phenotypes or to what extent the same or different genes drive such convergence. Here, we characterize one of the major genes responsible for mimetic wing pattern evolution in *Heliconius* butterflies. Mapping, gene expression, and population genetic work all identify a single gene, *optix*, that controls extreme red wing pattern variation across multiple species of *Heliconius*. Our results show that the cis-regulatory evolution of a single transcription factor can repeatedly drive the convergent evolution of complex color patterns in distantly related species, thus blurring the distinction between convergence and homology.

Additional References

Wing patterning gene redefines the mimetic history of *Heliconius* butterflies. (2011) (<https://pubmed.ncbi.nlm.nih.gov/22084094>)

RELATED GEPHE

Related Genes

2 (cortex, WntA) (<https://www.gephebase.org/search-criteria?/or+Taxon+ID=^34740^/and+Trait=Coloration/and+groupHaplotypes=true#gephebase-summary-title>)

Related Haplotypes

No matches found.

EXTERNAL LINKS

COMMENTS