

Optix (https://www.gephebase.org/search-criteria?/and+Gene+Gephebase=^Optix^#gephebase-summary-title)	Gephebase Gene	GP00000795	GepheID
Published	Entry Status	Martin	Main curator

	Trait Category		
Morphology (https://www.gephebase.org/search-criteria?/and+TraitCategory=^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 cydno - red basal hindwing patch		Trait State in Taxon B	
Heliconius pacheus - red dots on hindwings		Ancestral State	
Data not curated		Taxonomic Status	
Intraspecific (https://www.gephebase.org/search-criteria?/and+TaxonomicStatus=^Intraspecific^#gephebase-summary-title)			
	Taxon A		Taxon B
	Latin Name		Latin Name
Heliconius cydno https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=^Heliconius cydno^#gephebase-summary-title		Heliconius pacheus https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=^Heliconius pacheus^#gephebase-summary-title	
-	Common Name	-	Common Name
	Synonyms		Synonyms
Heliconius cydno Doubleday, 1847		Heliconius cydno pacheus; Heliconius pacheus Salvin, 1871	
species	Rank	species	Rank
	Lineage		Lineage
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; Obectomera; Papilionoidea; Nymphalidae; Heliconiinae; Heliconiini; Heliconius		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; Obectomera; Papilionoidea; Nymphalidae; Heliconiinae; Heliconiini; Heliconius	
	Parent		Parent
Heliconius () - (Rank: genus) https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 33416		Heliconius () - (Rank: genus) https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 33416	
NCBI Taxonomy ID		NCBI Taxonomy ID	
33424		33428	
https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 33424		https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 33428	
is Taxon A an Infrapopulation?		is Taxon B an Infrapopulation?	
No		No	

Optix	Generic Gene Name	UniProtKB Drosophila melanogaster
anon-WO0153538.79; CG18455; D-Six3; Dmel\CG18455; Dsix3; opt; optix; OPTIX; opx; six3; Six3	Synonyms	GenebankID or UniProtKB
	String	
7227.FBpp0302920 (http://string-db.org/newstring.cgi/show_network_section.pl?identifier= 7227.FBpp0302920)	Sequence Similarities	
Belongs to the SIX/Sine oculis homeobox family.	GO - Molecular Function	
GO:0043565 : sequence-specific DNA binding (https://www.ebi.ac.uk/QuickGO/term/GO:0043565)		
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 (aristaleless, WntA) (<https://www.gephebase.org/search-criteria?/or+Taxon ID=~33424^/and+Trait=Coloration/or+Taxon ID=~33428^/and+Trait=Coloration/and+groupHaplotypes=true#gephebase-summary-title>)

Related Haplotypes

No matches found.

EXTERNAL LINKS

COMMENTS