

## GEPHE SUMMARY

<p>WntA (<a href="https://www.gephebase.org/search-criteria?/and+Gene+Gephebase=~WntA^#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Gene+Gephebase=~WntA^#gephebase-summary-title</a>)</p> <p>Published</p>	<p>Gephebase Gene</p> <p>Entry Status</p>	<p>GP00001209</p> <p>Martin</p>	<p>GepheID</p> <p>Main curator</p>
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## PHENOTYPIC CHANGE

<p>Morphology (<a href="https://www.gephebase.org/search-criteria?/and+Trait+Category=~Morphology^#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Trait+Category=~Morphology^#gephebase-summary-title</a>)</p> <p>Coloration (wing, Mullerian mimicry) (<a href="https://www.gephebase.org/search-criteria?/and+Trait=~Coloration+(wing,+Mullerian+mimicry)^#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Trait=~Coloration+(wing,+Mullerian+mimicry)^#gephebase-summary-title</a>)</p> <p>Heliconius cydno alithea - polymorphic Ecuadorian population : presence of white hourglass pattern in discal cell</p> <p>Heliconius cydno alithea - polymorphic Ecuadorian population : absence of white hourglass pattern in discal cell</p> <p>Unknown</p> <p>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>)</p>	<p>Trait Category</p> <p>Trait</p> <p>Trait State in Taxon A</p> <p>Trait State in Taxon B</p> <p>Ancestral State</p> <p>Taxonomic Status</p>	<p>Heliconius cydno</p> <p>(<a href="https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=~Heliconius+cydno^#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=~Heliconius+cydno^#gephebase-summary-title</a>)</p> <p>-</p> <p>Heliconius cydno Doubleday, 1847</p> <p>species</p> <p>cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Protostomia; Ecdysozoa; Panarthropoda; Arthropoda; Mandibulata; Pancrustacea; Hexapoda; Insecta; Dicondylia; Pterygota; Neoptera; Holometabola; Amphimesmenoptera; Lepidoptera; Glossata; Neolepidoptera; Heteroneura; Dityrsia; Obtectomera; Papilionoidea; Nymphalidae; Heliconiinae; Heliconiini; Heliconius</p> <p>Heliconius () - (Rank: genus)</p> <p>(<a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=33424">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=33424</a>)</p> <p>33424</p> <p>(<a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=33424">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=33424</a>)</p> <p>Yes</p> <p>is Taxon A an Intraspecies?</p> <p>Yes</p> <p>Heliconius cydno alithea - polymorphic Ecuadorian population : presence of white hourglass pattern in discal cell</p>	<p>Taxon A</p> <p>Latin Name</p> <p>Common Name</p> <p>Synonyms</p> <p>Rank</p> <p>Lineage</p> <p>Parent</p> <p>NCBI Taxonomy ID</p> <p>is Taxon A an Intraspecies?</p> <p>Taxon A Description</p>	<p>Heliconius cydno</p> <p>(<a href="https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=~Heliconius+cydno^#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=~Heliconius+cydno^#gephebase-summary-title</a>)</p> <p>-</p> <p>Heliconius cydno Doubleday, 1847</p> <p>species</p> <p>cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Protostomia; Ecdysozoa; Panarthropoda; Arthropoda; Mandibulata; Pancrustacea; Hexapoda; Insecta; Dicondylia; Pterygota; Neoptera; Holometabola; Amphimesmenoptera; Lepidoptera; Glossata; Neolepidoptera; Heteroneura; Dityrsia; Obtectomera; Papilionoidea; Nymphalidae; Heliconiinae; Heliconiini; Heliconius</p> <p>Heliconius () - (Rank: genus)</p> <p>(<a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=33424">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=33424</a>)</p> <p>33424</p> <p>(<a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=33424">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=33424</a>)</p> <p>Yes</p> <p>is Taxon B an Intraspecies?</p> <p>Yes</p> <p>Heliconius cydno alithea - polymorphic Ecuadorian population : absence of white hourglass pattern in discal cell</p>	<p>Taxon B</p> <p>Latin Name</p> <p>Common Name</p> <p>Synonyms</p> <p>Rank</p> <p>Lineage</p> <p>Parent</p> <p>NCBI Taxonomy ID</p> <p>is Taxon B an Intraspecies?</p> <p>Taxon B Description</p>
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## GENOTYPIC CHANGE

<p>WntA</p> <p>-</p> <p>-</p> <p>Belongs to the Wnt family.</p> <p>GO:0005102 : signaling receptor binding</p> <p>(<a href="https://www.ebi.ac.uk/QuickGO/term/GO:0005102">https://www.ebi.ac.uk/QuickGO/term/GO:0005102</a>)</p>	<p>Generic Gene Name</p> <p>Synonyms</p> <p>String</p> <p>Sequence Similarities</p> <p>GO - Molecular Function</p> <p>GO - Biological Process</p>	<p>A0A077DF90 (<a href="http://www.uniprot.org/uniprot/A0A077DF90">http://www.uniprot.org/uniprot/A0A077DF90</a>)</p> <p>()</p>	<p>UniProtKB Vanessa cardui</p> <p>GenebankID or UniProtKB</p>
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GO:0007275 : multicellular organism development  
(<https://www.ebi.ac.uk/QuickGO/term/GO:0007275>)  
GO:0016055 : Wnt signaling pathway  
(<https://www.ebi.ac.uk/QuickGO/term/GO:0016055>)

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=~No^#gephebase-summary-title))

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=~Cis-regulatory^#gephebase-summary-title))

Aberration Type

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

Indel Size

1-10 kb

Molecular Details of the Mutation

1.8-kb indel that was perfectly associated with variation in forewing melanin patterning

Experimental Evidence

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

Main Reference

Ancient homology underlies adaptive mimetic diversity across butterflies. (2014) (<https://pubmed.ncbi.nlm.nih.gov/25198507>)

Authors

Gallant JR; Imhoff VE; Martin A; Savage WK; Chamberlain NL; Pote BL; Peterson C; Smith GE; Evans B; Reed RD; Kronforst MR; Mullen SP

Abstract

Convergent evolution provides a rare, natural experiment with which to test the predictability of adaptation at the molecular level. Little is known about the molecular basis of convergence over macro-evolutionary timescales. Here we use a combination of positional cloning, population genomic resequencing, association mapping and developmental data to demonstrate that positionally orthologous nucleotide variants in the upstream region of the same gene, *WntA*, are responsible for parallel mimetic variation in two butterfly lineages that diverged >65 million years ago. Furthermore, characterization of spatial patterns of *WntA* expression during development suggests that alternative regulatory mechanisms underlie wing pattern variation in each system. Taken together, our results reveal a strikingly predictable molecular basis for phenotypic convergence over deep evolutionary time.

Additional References

Diversification of complex butterfly wing patterns by repeated regulatory evolution of a *Wnt* ligand. (2012) (<https://pubmed.ncbi.nlm.nih.gov/22802635>)

## RELATED GEPHE

Related Genes

2 (*aristalless*, *Optix*) ([https://www.gephebase.org/search-criteria?/or+Taxon ID=~33424^/and+Trait=Coloration/and+groupHaplotypes=true#gephebase-summary-title](https://www.gephebase.org/search-criteria?/or+Taxon+ID=~33424^/and+Trait=Coloration/and+groupHaplotypes=true#gephebase-summary-title))

Related Haplotypes

1 ([https://www.gephebase.org/search-criteria?/or+Gene Gephebase=~WntA^/and+Taxon ID=~33424^/or+Gene Gephebase=~WntA^/and+Taxon ID=~33424^#gephebase-summary-title](https://www.gephebase.org/search-criteria?/or+Gene+Gephebase=~WntA^/and+Taxon+ID=~33424^/or+Gene+Gephebase=~WntA^/and+Taxon+ID=~33424^#gephebase-summary-title))

## EXTERNAL LINKS

## COMMENTS

Transposon with cis-regulatory effect (Gene Expression Shift) ; Admixture Mapping in Polymorphic Population reinforcing previous Linkage Mapping result.