GEPHE SUMMARY

Gephebase Gene
WntA (https://www.gephebase.org/search-criteria?/and+Gene Gephebase=^WntA^#gephebase-summary-title)

GepheID
GP00001208

Entry Status
Published

Main curator
Courtier

PHENOTYPIC CHANGE

Trait Category
Morphology (https://www.gephebase.org/search-criteria?/and+Trait Category=^Morphology^#gephebase-summary-title)

Trait
Coloration (wing; Batesian mimicry) (https://www.gephebase.org/search-criteria?/and+Trait=^Coloration (wing; Batesian mimicry)^#gephebase-summary-title)

Trait State in Taxon A
Limenitis arthemis arthemis - White Admiral (with White Band)

Trait State in Taxon B
Limenitis arthemis astyanax - Red Spotted Purple (melanic morph without a white band ; mimic of Pipevine Swallowtail in southern range of the species distribution)

Ancestral State
Unknown

Taxonomic Status
Intraspecific (https://www.gephebase.org/search-criteria?/and+Taxonomic Status=^Intraspecific^#gephebase-summary-title)

Taxon A

Latin Name
Limenitis arthemis (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=^Limenitis arthemis^#gephebase-summary-title)

Common Name
white admiral

Synonyms
Basilarchia arthemis; white admiral; Basilarchia arthemis (Drury, 1773)

Rank
species

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; Obtectomera; Papilionoidea; Nymphalidae; Limenitidinae; Limenitidini; Limenitis

Parent
Limenitis (admirals) - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 124410)

NCBI Taxonomy ID
124411 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 124411)

is Taxon A an Infraspecies?
Yes

Taxon A Description
Limenitis arthemis arthemis - White Admiral (with White Band)

Taxon B

Latin Name
Limenitis arthemis (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=^Limenitis arthemis^#gephebase-summary-title)

Common Name
white admiral

Synonyms
Basilarchia arthemis; white admiral; Basilarchia arthemis (Drury, 1773)

Rank
species

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; Obtectomera; Papilionoidea; Nymphalidae; Limenitidinae; Limenitidini; Limenitis

Parent
Limenitis (admirals) - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 124410)

NCBI Taxonomy ID
124411 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 124411)

is Taxon B an Infraspecies?
Yes

Taxon B Description
Limenitis arthemis astyanax - Red Spotted Purple (melanic morph without a white band ; mimic of Pipevine Swallowtail in southern range of the species distribution)

GENOTYPIC CHANGE

Generic Gene Name
WntA

Synonyms
-

String
-

Sequence Similarities
Belongs to the Wnt family.

GO - Molecular Function
GO:0005102 : signaling receptor binding (https://www.ebi.ac.uk/QuickGO/term/GO:0005102)

GO - Biological Process
GO:0007275 : multicellular organism development

UniProtKB Vanessa cardui
A0A077DF90 (http://www.uniprot.org/uniprot/A0A077DF90)

GenebankID or UniProtKB
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(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)

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

Complex Haplotype in first intron perfectly associated with phenotype: 173 fixed single-nucleotide polymorphisms (SNPs) in complete linkage disequilibrium (LD) located 23

Experimental Evidence

Linkage Mapping (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

RELATED GEPHE

Related Genes

No matches found.

Related Haplotypes

No matches found.

EXTERNAL LINKS

COMMENTS

@TE ; Mimicry ; @Fitness Adaptive ; Linkage + Association Mapping