GEPHE SUMMARY

Gephebase Gene

BarH1 (https://www.gephebase.org/search-criteria?/and+Gene Gephebase=^BarH1^#gephebase-summary-title)

GepheID

GP00002095

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

Trait State in Taxon A

orange females - orange wings; slower pupal development; smaller fat body; significantly fewer mature eggs at eclosion

Trait State in Taxon B

Alba females - white wings; faster pupal development; larger fat body; significantly more mature eggs at eclosion

Ancestral State

Taxon A

Taxonomic Status

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

Taxon A

Latin Name

Colias croceus (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=^Colias croceus^#gephebase-summary-title)

Common Name

clouded yellow

Synonyms

Colias crocea; Papilio croceus; clouded yellow; clouded yellow butterfly; Colias croceus (Fourcroy, 1785); Colias croceus (Geoffroy, 1785)

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; Pieridae; Coliadinae; Colias

Parent

Colias (clouded yellows) - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 42295)

NCBI Taxonomy ID

72248 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 72248)

is Taxon A an Infraspecies?

No

Taxon B

Latin Name

Colias croceus (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=^Colias croceus^#gephebase-summary-title)

Common Name

clouded yellow

Synonyms

Colias crocea; Papilio croceus; clouded yellow; clouded yellow butterfly; Colias croceus (Fourcroy, 1785); Colias croceus (Geoffroy, 1785)

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; Pieridae; Coliadinae; Colias

Parent

Colias (clouded yellows) - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 42295)

NCBI Taxonomy ID

72248 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 72248)

is Taxon B an Infraspecies?

No

GENOTYPIC CHANGE

Generic Gene Name

B-H1

Synonyms

Bar; Bar H1; bar-h1; Bar-H1; BarH; barh1; barH1; Barh1; BarHI; BH1; CG5529; Dmel\CG5529

String

7227.FBpp0074204 (http://string-db.org/newstring_cgi/show_network_section.pl?identifier= 7227.FBpp0074204)

Sequence Similarities

Belongs to the Antp homeobox family.

GO - Molecular Function

GO:0001228 : DNA-binding transcription activator activity, RNA polymerase II-specific (https://www.ebi.ac.uk/QuickGO/term/GO:0001228)

UniProtKB Drosophila melanogaster

Q24255 (http://www.uniprot.org/uniprot/Q24255)

GenebankID or UniProtKB

()

GO:0000977 : RNA polymerase II regulatory region sequence-specific DNA binding (https://www.ebi.ac.uk/QuickGO/term/GO:0000977)
GO:0000981 : DNA-binding transcription factor activity, RNA polymerase II-specific (https://www.ebi.ac.uk/QuickGO/term/GO:0000981)

GO - Biological Process

GO:0008407 : chaeta morphogenesis (https://www.ebi.ac.uk/QuickGO/term/GO:0008407)
GO:0007399 : nervous system development (https://www.ebi.ac.uk/QuickGO/term/GO:0007399)
GO:0006357 : regulation of transcription by RNA polymerase II (https://www.ebi.ac.uk/QuickGO/term/GO:0006357)
GO:0000122 : negative regulation of transcription by RNA polymerase II (https://www.ebi.ac.uk/QuickGO/term/GO:0000122)
GO:0045892 : negative regulation of transcription, DNA-templated (https://www.ebi.ac.uk/QuickGO/term/GO:0045892)
GO:0007455 : eye-antennal disc morphogenesis (https://www.ebi.ac.uk/QuickGO/term/GO:0007455)
GO:0007479 : leg disc proximal/distal pattern formation (https://www.ebi.ac.uk/QuickGO/term/GO:0007479)
GO:0001751 : compound eye photoreceptor cell differentiation (https://www.ebi.ac.uk/QuickGO/term/GO:0001751)
GO:0007601 : visual perception (https://www.ebi.ac.uk/QuickGO/term/GO:0007601)
GO:0048513 : animal organ development (https://www.ebi.ac.uk/QuickGO/term/GO:0048513)
GO:0050896 : response to stimulus (https://www.ebi.ac.uk/QuickGO/term/GO:0050896)
GO:0008057 : eye pigment granule organization (https://www.ebi.ac.uk/QuickGO/term/GO:0008057)
GO:0008052 : sensory organ boundary specification (https://www.ebi.ac.uk/QuickGO/term/GO:0008052)
GO:0009888 : tissue development (https://www.ebi.ac.uk/QuickGO/term/GO:0009888)

GO - Cellular Component

GO:0005634 : nucleus (https://www.ebi.ac.uk/QuickGO/term/GO:0005634)

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

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

Insertion Size

1-10 kb

Molecular Details of the Mutation

insertion of a Jockey-like transposable element 6â€‰kb downstream of the Colias homolog of BarH-1. BarH-1 expression suppresses orange coloration in the wings.

Experimental Evidence

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

Main Reference

A transposable element insertion is associated with anÂ alternative life history strategy. (2019) (https://pubmed.ncbi.nlm.nih.gov/31848330)

Authors

Woronik A; TunstrÃ¶m K; Perry MW; Neethiraj R; Stefanescu C; Celorio-Mancera MP; BrattstrÃ¶m O; Hill J; Lehmann P; KÃ¤kelÃ¤ R; Wheat CW

Abstract

Tradeoffs affect resource allocation during development and result in fitness consequences that drive the evolution of life history strategies. Yet despite their importance, we know little about the mechanisms underlying life history tradeoffs. Many species of Colias butterflies exhibit an alternative life history strategy (ALHS) where females divert resources from wing pigment synthesis to reproductive and somatic development. Due to this reallocation, a wing color polymorphism is associated with the ALHS: either yellow/orange or white. Here we map the locus associated with this ALHS in Colias crocea to a transposable element insertion located downstream of the Colias homolog of BarH-1, a homeobox transcription factor. Using CRISPR/Cas9 gene editing, antibody staining, and electron microscopy we find white-specific expression of BarH-1 suppresses the formation of pigment granules in wing scales and gives rise to white wing color. Lipid and transcriptome analyses reveal physiological differences associated with the ALHS. Together, these findings characterize a mechanism for a female-limited ALHS.

Additional References

RELATED GEPHE

Related Genes

No matches found.

Related Haplotypes

No matches found.

EXTERNAL LINKS

COMMENTS

@TE