

GEPHE SUMMARY

trehalase (https://www.gephebase.org/search-criteria/?and+Gene Gephebase=trehalase^#gephebase-summary-title)	Gephebase Gene	GP00002421	GepheID
	Entry Status	Courtier	Main curator
Published			

PHENOTYPIC CHANGE

Trait Category			
Morphology (https://www.gephebase.org/search-criteria/?and+Trait Category=Morphology^#gephebase-summary-title)	Trait		
Coloration (wing; seasonal) (https://www.gephebase.org/search-criteria/?and+Trait=^Coloration (wing; seasonal)^#gephebase-summary-title)	Trait State in Taxon A		
Plastic line - the dark red wing phenotype is induced by environmental cues	Trait State in Taxon B		
Red line - the dark red wing phenotype is formed irrespective of the external conditions	Ancestral State		
Taxon A	Taxonomic Status		
Junonia coenia (https://www.gephebase.org/search-criteria/?and+Taxon and Synonyms=^Junonia coenia^#gephebase-summary-title)	Latin Name	Junonia coenia (https://www.gephebase.org/search-criteria/?and+Taxon and Synonyms=^Junonia coenia^#gephebase-summary-title)	Latin Name
buckeye	Common Name	buckeye	Common Name
Precis coenia; buckeye; peacock butterfly; Junonia coenia Hubner, 1822	Synonyms	Precis coenia; buckeye; peacock butterfly; Junonia coenia Hubner, 1822	Synonyms
species	Rank	species	Rank
cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Protostomia; Ecdysozoa; Panarthropoda; Arthropoda; Mandibulata; Pancrustacea; Hexapoda; Insecta; Dicondylia; Pterygota; Neoptera; Endopterygota; Amphiesmenoptera; Lepidoptera; Glossata; Neolepidoptera; Heteroneura; Ditrysia; Obtectomera; Papilionoidea; Nymphalidae; Nymphalinae; Junoniini; Junonia	Lineage	cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Protostomia; Ecdysozoa; Panarthropoda; Arthropoda; Mandibulata; Pancrustacea; Hexapoda; Insecta; Dicondylia; Pterygota; Neoptera; Endopterygota; Amphiesmenoptera; Lepidoptera; Glossata; Neolepidoptera; Heteroneura; Ditrysia; Obtectomera; Papilionoidea; Nymphalidae; Nymphalinae; Junoniini; Junonia	Lineage
Junonia (buckeyes) - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 39707)	Parent	Junonia (buckeyes) - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 39707)	Parent
39708 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 39708)	NCBI Taxonomy ID	39708 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 39708)	NCBI Taxonomy ID
No	is Taxon A an Infraspecies?	No	is Taxon B an Infraspecies?

GENOTYPIC CHANGE

Treh	Generic Gene Name	UniProtKB Drosophila melanogaster
	Synonyms	GenebankID or UniProtKB
Tre; 87D3T; anon-EST:Posey159; anon-sts38; CG9364; Dmel\CG9364; DmTre; ESTS:87D3T; TRE; TREH	0	
7227.FBpp0071468 (http://string-db.org/newstring_cgi/show_network_section.pl?identifier= 7227.FBpp0071468)	String	
Belongs to the glycosyl hydrolase 37 family.	Sequence Similarities	
GO:0004555 : alpha,alpha-trehalase activity (https://www.ebi.ac.uk/QuickGO/term/GO:0004555)	GO - Molecular Function	
GO:0097150 : neuronal stem cell population maintenance (https://www.ebi.ac.uk/QuickGO/term/GO:0097150)	GO - Biological Process	

GO:0005993 : trehalose catabolic process
(<https://www.ebi.ac.uk/QuickGO/term/GO:0005993>)
GO:0005991 : trehalose metabolic process
(<https://www.ebi.ac.uk/QuickGO/term/GO:0005991>)

GO - Cellular Component

GO:0005737 : cytoplasm (<https://www.ebi.ac.uk/QuickGO/term/GO:0005737>)

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

Increased expression of the trehalase gene in the Red line. No variation in coding region. Strong association with cis-regulatory SNP.

Experimental Evidence

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

Main Reference

Genomic architecture of a genetically assimilated seasonal color pattern. (2020) (<https://pubmed.ncbi.nlm.nih.gov/33154142>)

Authors

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Abstract

Developmental plasticity allows genomes to encode multiple distinct phenotypes that can be differentially manifested in response to environmental cues. Alternative plastic phenotypes can be selected through a process called genetic assimilation, although the mechanisms are still poorly understood. We assimilated a seasonal wing color phenotype in a naturally plastic population of butterflies (*Junonia coenia*) and characterized three responsible genes. Endocrine assays and chromatin accessibility and conformation analyses showed that the transition of wing coloration from an environmentally determined trait to a predominantly genetic trait occurred through selection for regulatory alleles of downstream wing-patterning genes. This mode of genetic evolution is likely favored by selection because it allows tissue- and trait-specific tuning of reaction norms without affecting core cue detection or transduction mechanisms.

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Additional References

RELATED GEPHE

2 (cortex, herfst) (<https://www.gephebase.org/search-criteria?/or+Taxon+ID=^39708^/and+Trait=Coloration/and+groupHaplotypes=true#gephebase-summary-title>)

Related Genes

Related Haplotypes

No matches found.

EXTERNAL LINKS

COMMENTS

@Parallelism @GxE The two color morphs of *Junonia coenia*, light tan and dark red, depend on day length and temperature.