

GEPHE SUMMARY

	Gephebase Gene		GepheID
cortex (https://www.gephebase.org/search-criteria?/and+GeneGephebase=~cortex~#gephebase-summary-title)		GP00001804	
	Entry Status	Martin	Main curator
Published			

PHENOTYPIC CHANGE

	Trait Category		
Morphology (https://www.gephebase.org/search-criteria?/and+TraitCategory=~Morphology~#gephebase-summary-title)		Trait	
Coloration (wing ; industrial melanism ; camouflage) (https://www.gephebase.org/search-criteria?/and+Trait=~Coloration (wing ; industrial melanism ; camouflage)~#gephebase-summary-title)			
	Trait State in Taxon A		
common pale (peppered) typica form		Trait State in Taxon B	
melanic carbonaria form			
	Ancestral State		
Taxon A		Taxonomic Status	
Intraspecific (https://www.gephebase.org/search-criteria?/and+TaxonomicStatus=~Intraspecific~#gephebase-summary-title)			
	Taxon A		Taxon B
	Latin Name		Latin Name
Biston betularia (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=~Biston betularia~#gephebase-summary-title)		Biston betularia (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=~Biston betularia~#gephebase-summary-title)	
	Common Name		Common Name
pepper-and-salt moth		pepper-and-salt moth	
	Synonyms		Synonyms
Biston betularium; Biston betularius; pepper-and-salt moth; peppered moth; Biston betularius (Linnaeus, 1758)		Biston betularium; Biston betularius; pepper-and-salt moth; peppered moth; Biston betularius (Linnaeus, 1758)	
	Rank		Rank
species		species	
	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; Obtectomera; Geometroidea; Geometridae; Ennominae; Biston		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; Geometroidea; Geometridae; Ennominae; Biston	
	Parent		Parent
Biston () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 82594)		Biston () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 82594)	
	NCBI Taxonomy ID		NCBI Taxonomy ID
82595 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 82595)		82595 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 82595)	
	is Taxon A an Intraspecies?		is Taxon B an Intraspecies?
Yes		Yes	
	Taxon A Description		Taxon B Description
Biston betularia typica (UK)		Biston betularia carbonaria (UK)	

GENOTYPIC CHANGE

	Generic Gene Name		UniProtKB Drosophila melanogaster
cort		Q960N3 (http://www.uniprot.org/uniprot/Q960N3)	
	Synonyms		GenebankID or UniProtKB
CG11330; cor; Cort; Dmel\CG11330		KT182637 (https://www.ncbi.nlm.nih.gov/nuccore/KT182637)	
	String		
7227.FBpp0078949 (http://string-db.org/newstring.cgi/show_network_section.pl?identifier= 7227.FBpp0078949)			
	Sequence Similarities		
Belongs to the WD repeat CORT family.			
	GO - Molecular Function		
GO:0010997 : anaphase-promoting complex binding (https://www.ebi.ac.uk/QuickGO/term/GO:0010997)			

GO:0097027 : ubiquitin-protein transferase activator activity
(<https://www.ebi.ac.uk/QuickGO/term/GO:0097027>)

GO - Biological Process

GO:0048477 : oogenesis (<https://www.ebi.ac.uk/QuickGO/term/GO:0048477>)
GO:0045143 : homologous chromosome segregation
(<https://www.ebi.ac.uk/QuickGO/term/GO:0045143>)
GO:0031145 : anaphase-promoting complex-dependent catabolic process
(<https://www.ebi.ac.uk/QuickGO/term/GO:0031145>)
GO:0007349 : cellularization (<https://www.ebi.ac.uk/QuickGO/term/GO:0007349>)
GO:0007343 : egg activation (<https://www.ebi.ac.uk/QuickGO/term/GO:0007343>)
GO:0007144 : female meiosis I (<https://www.ebi.ac.uk/QuickGO/term/GO:0007144>)
GO:0007147 : female meiosis II (<https://www.ebi.ac.uk/QuickGO/term/GO:0007147>)
GO:0007143 : female meiotic nuclear division
(<https://www.ebi.ac.uk/QuickGO/term/GO:0007143>)
GO:0007279 : pole cell formation (<https://www.ebi.ac.uk/QuickGO/term/GO:0007279>)
GO:1905786 : positive regulation of anaphase-promoting complex-dependent catabolic
process (<https://www.ebi.ac.uk/QuickGO/term/GO:1905786>)
GO:1904668 : positive regulation of ubiquitin protein ligase activity
(<https://www.ebi.ac.uk/QuickGO/term/GO:1904668>)

GO - Cellular Component

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

No (https://www.gephebase.org/search-criteria?/and+Presumptive Null=~No~#gephebase-summary-title)	Presumptive Null
Cis-regulatory (https://www.gephebase.org/search-criteria?/and+Molecular Type=~Cis-regulatory~#gephebase-summary-title)	Molecular Type
Insertion (https://www.gephebase.org/search-criteria?/and+Aberration Type=~Insertion~#gephebase-summary-title)	Aberration Type
10-100 kb	Insertion Size
Putative transposon insertion within the first intron ; consists of of ~9 kb tandemly repeated 2.3 times + three short tandem subrepeat units	Molecular Details of the Mutation
Linkage Mapping (https://www.gephebase.org/search-criteria?/and+Experimental Evidence=~Linkage Mapping~#gephebase-summary-title)	Experimental Evidence
The industrial melanism mutation in British peppered moths is a transposable element. (2016) (https://pubmed.ncbi.nlm.nih.gov/27251284)	Main Reference
Van't Hof AE; Campagne P; Rigden DJ; Yung CJ; Lingley J; Quail MA; Hall N; Darby AC; Saccheri IJ	Authors

Discovering the mutational events that fuel adaptation to environmental change remains an important challenge for evolutionary biology. The classroom example of a visible evolutionary response is industrial melanism in the peppered moth (<i>Biston betularia</i>): the replacement, during the Industrial Revolution, of the common pale typica form by a previously unknown black (<i>carbonaria</i>) form, driven by the interaction between bird predation and coal pollution. The <i>carbonaria</i> locus has been coarsely localized to a 200-kilobase region, but the specific identity and nature of the sequence difference controlling the <i>carbonaria</i> -typica polymorphism, and the gene it influences, are unknown. Here we show that the mutation event giving rise to industrial melanism in Britain was the insertion of a large, tandemly repeated, transposable element into the first intron of the gene cortex. Statistical inference based on the distribution of recombined <i>carbonaria</i> haplotypes indicates that this transposition event occurred around 1819, consistent with the historical record. We have begun to dissect the mode of action of the <i>carbonaria</i> transposable element by showing that it increases the abundance of a cortex transcript, the protein product of which plays an important role in cell-cycle regulation, during early wing disc development. Our findings fill a substantial knowledge gap in the iconic example of microevolutionary change, adding a further layer of insight into the mechanism of adaptation in response to natural selection. The discovery that the mutation itself is a transposable element will stimulate further debate about the importance of ‘jumping genes’ as a source of major phenotypic novelty.	Abstract
	Additional References

RELATED GEPHE

No matches found.	Related Genes
No matches found.	Related Haplotypes

EXTERNAL LINKS

COMMENTS

@TE @Parallelism

