

GEPHE SUMMARY

	Gephebase Gene	GepheID
Agouti (https://www.gephebase.org/search-criteria/?and+Gene Gephebase="Agouti">#gephebase-summary-title)	GP00000057	
Published	Entry Status	Main curator

PHENOTYPIC CHANGE

	Trait Category
Morphology (https://www.gephebase.org/search-criteria/?and+Trait Category="Morphology">#gephebase-summary-title)	Trait
Coloration (coat; dorso-ventral) (https://www.gephebase.org/search-criteria/?and+Trait=^Coloration+(coat;+dorso-ventral)+#gephebase-summary-title)	Trait State in Taxon A
mainland brown coat	Trait State in Taxon B
gulf beach and atlantic beach light coloured coats	Ancestral State
Taxon A	Taxonomic Status

	Taxon A #1	Taxon B #1
	Latin Name	Latin Name
Peromyscus polionotus subgriseus (#gephebase-summary-title">https://www.gephebase.org/search-criteria/?and+Taxon+and+Synonyms=^Peromyscus+polionotus+subgriseus">#gephebase-summary-title)	Peromyscus polionotus leucocephalus (#gephebase-summary-title">https://www.gephebase.org/search-criteria/?and+Taxon+and+Synonyms=^Peromyscus+polionotus+leucocephalus">#gephebase-summary-title)	
-	Common Name	Common Name
-	Synonyms	Synonyms
-	Rank	Rank
subspecies	Lineage	Lineage
cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Deuterostomia; Chordata; Craniata; Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Sarcopterygii; Dipnotetrapodomorpha; Tetrapoda; Amniota; Mammalia; Theria; Eutheria; Boreoeutheria; Euarchontoglires; Glires; Rodentia; Myomorpha; Muroidea; Cricetidae; Neotominae; Peromyscus; Peromyscus polionotus	cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Deuterostomia; Chordata; Craniata; Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Sarcopterygii; Dipnotetrapodomorpha; Tetrapoda; Amniota; Mammalia; Theria; Eutheria; Boreoeutheria; Euarchontoglires; Glires; Rodentia; Myomorpha; Muroidea; Cricetidae; Neotominae; Peromyscus; Peromyscus polionotus	
Peromyscus polionotus (oldfield mouse) - (Rank: species) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=42413)	Parent	Parent
369710 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=369710)	NCBI Taxonomy ID	NCBI Taxonomy ID
Yes	is Taxon A an Infraspecies?	is Taxon B an Infraspecies?
	Taxon A Description	Taxon B Description
Peromyscus polionotus subgriseus (mainland dark colored coat)	Peromyscus polionotus leucocephalus (gulf beach)	

	Taxon A #2	Taxon B #2
	Latin Name	Latin Name
Peromyscus polionotus polionotus (#gephebase-summary-title">https://www.gephebase.org/search-criteria/?and+Taxon+and+Synonyms=^Peromyscus+polionotus+polionotus">#gephebase-summary-title)	Peromyscus polionotus niveiventris (#gephebase-summary-title">https://www.gephebase.org/search-criteria/?and+Taxon+and+Synonyms=^Peromyscus+polionotus+niveiventris">#gephebase-summary-title)	
-	Common Name	Common Name
-	Synonyms	Synonyms
-	Rank	Rank
subspecies	Lineage	Lineage
cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Deuterostomia; Chordata; Craniata; Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Sarcopterygii; Dipnotetrapodomorpha; Tetrapoda; Amniota; Mammalia; Theria; Eutheria; Boreoeutheria; Euarchontoglires; Glires; Rodentia; Myomorpha; Muroidea; Cricetidae; Neotominae; Peromyscus; Peromyscus polionotus	cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Deuterostomia; Chordata; Craniata; Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Sarcopterygii; Dipnotetrapodomorpha; Tetrapoda; Amniota; Mammalia; Theria; Eutheria; Boreoeutheria; Euarchontoglires; Glires; Rodentia; Myomorpha; Muroidea; Cricetidae; Neotominae; Peromyscus; Peromyscus polionotus	
Peromyscus polionotus (oldfield mouse) - (Rank: species)	Parent	Parent
	Peromyscus polionotus (oldfield mouse) - (Rank: species)	

(<https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 42413>)
NCBI Taxonomy ID
582894
(<https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 582894>)
is Taxon A an Infraspecies?
Yes
Taxon A Description
Peromyscus polionotus polionotus (mainland dark colored coat)

(<https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 42413>)
NCBI Taxonomy ID
423565
(<https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 423565>)
is Taxon B an Infraspecies?
Yes
Taxon B Description
Peromyscus polionotus niveiventris (atlantic beach)

Taxon A #3
Latin Name
Peromyscus polionotus albifrons
(<https://www.gephbase.org/search-criteria?/and+Taxon and Synonyms=%Peromyscus polionotus albifrons%#gephbase-summary-title>)
Common Name
-
Synonyms
-
Rank
Peromyscus polionotus albifrons Osgood, 1909
Lineage
cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria;
Deuterostomia; Chordata; Craniata; Vertebrata; Gnathostomata; Teleostomi;
Euteleostomi; Sarcopterygii; Dipnotetrapodomorpha; Tetrapoda; Amniota; Mammalia;
Theria; Eutheria; Boreoeutheria; Euarchontoglires; Glires; Rodentia; Myomorpha;
Muroidea; Cricetidae; Neotominae; Peromyscus; Peromyscus polionotus
Parent
Peromyscus polionotus (oldfield mouse) - (Rank: species)
(<https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 42413>)
NCBI Taxonomy ID
2944645
(<https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 2944645>)
is Taxon A an Infraspecies?
Yes
Taxon A Description
Peromyscus polionotus albifrons (mainland dark colored coat)

Taxon B #3
Latin Name
Peromyscus polionotus peninsularis
(<https://www.gephbase.org/search-criteria?/and+Taxon and Synonyms=%Peromyscus polionotus peninsularis%#gephbase-summary-title>)
Common Name
-
Synonyms
-
Rank
subspecies
Lineage
cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria;
Deuterostomia; Chordata; Craniata; Vertebrata; Gnathostomata; Teleostomi;
Euteleostomi; Sarcopterygii; Dipnotetrapodomorpha; Tetrapoda; Amniota; Mammalia;
Theria; Eutheria; Boreoeutheria; Euarchontoglires; Glires; Rodentia; Myomorpha;
Muroidea; Cricetidae; Neotominae; Peromyscus; Peromyscus polionotus
Parent
Peromyscus polionotus (oldfield mouse) - (Rank: species)
(<https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 42413>)
NCBI Taxonomy ID
582898
(<https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 582898>)
is Taxon B an Infraspecies?
Yes
Taxon B Description
Peromyscus polionotus peninsularis (gulf beach)

Taxon B #4
Latin Name
Peromyscus polionotus allophrys
(<https://www.gephbase.org/search-criteria?/and+Taxon and Synonyms=%Peromyscus polionotus allophrys%#gephbase-summary-title>)
Common Name
-
Synonyms
-
Rank
subspecies
Lineage
cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria;
Deuterostomia; Chordata; Craniata; Vertebrata; Gnathostomata; Teleostomi;
Euteleostomi; Sarcopterygii; Dipnotetrapodomorpha; Tetrapoda; Amniota; Mammalia;
Theria; Eutheria; Boreoeutheria; Euarchontoglires; Glires; Rodentia; Myomorpha;
Muroidea; Cricetidae; Neotominae; Peromyscus; Peromyscus polionotus
Parent
Peromyscus polionotus (oldfield mouse) - (Rank: species)
(<https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 42413>)
NCBI Taxonomy ID
582897
(<https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 582897>)
is Taxon B an Infraspecies?
Yes
Taxon B Description
Peromyscus polionotus allophrys (gulf beach)

Taxon B #5
Latin Name
Peromyscus polionotus trissyllepsis
(<https://www.gephbase.org/search-criteria?/and+Taxon and Synonyms=%Peromyscus polionotus trissyllepsis%#gephbase-summary-title>)
Common Name
-
Synonyms
-

	Rank
subspecies	Lineage
	cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Deuterostomia; Chordata; Craniata; Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Sarcopterygii; Dipnotetrapodomorpha; Tetrapoda; Amniota; Mammalia; Theria; Eutheria; Boreoeutheria; Euarchontoglires; Glires; Rodentia; Myomorpha; Muroidea; Cricetidae; Neotominae; Peromyscus; Peromyscus polionotus
	Parent
Peromyscus polionotus (oldfield mouse) - (Rank: species) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 42413)	NCBI Taxonomy ID
582896 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 582896)	is Taxon B an Infraspecies?
Yes	Taxon B Description
Peromyscus polionotus trissyllepsis (gulf beach)	

	Taxon B #6
	Latin Name
Peromyscus polionotus ammobates (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=%Peromyscus polionotus ammobates%#gephebase-summary-title)	Common Name
-	Synonyms
-	Rank
subspecies	Lineage
	cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Deuterostomia; Chordata; Craniata; Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Sarcopterygii; Dipnotetrapodomorpha; Tetrapoda; Amniota; Mammalia; Theria; Eutheria; Boreoeutheria; Euarchontoglires; Glires; Rodentia; Myomorpha; Muroidea; Cricetidae; Neotominae; Peromyscus; Peromyscus polionotus
	Parent
Peromyscus polionotus (oldfield mouse) - (Rank: species) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 42413)	NCBI Taxonomy ID
65021 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 65021)	is Taxon B an Infraspecies?
Yes	Taxon B Description
Peromyscus polionotus ammobates (gulf beach)	

	Taxon B #7
	Latin Name
Peromyscus polionotus albifrons (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=%Peromyscus polionotus albifrons%#gephebase-summary-title)	Common Name
-	Synonyms
Peromyscus polionotus albifrons Osgood, 1909	Rank
subspecies	Lineage
	cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Deuterostomia; Chordata; Craniata; Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Sarcopterygii; Dipnotetrapodomorpha; Tetrapoda; Amniota; Mammalia; Theria; Eutheria; Boreoeutheria; Euarchontoglires; Glires; Rodentia; Myomorpha; Muroidea; Cricetidae; Neotominae; Peromyscus; Peromyscus polionotus
	Parent
Peromyscus polionotus (oldfield mouse) - (Rank: species) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 42413)	NCBI Taxonomy ID
2944645 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 2944645)	is Taxon B an Infraspecies?
Yes	Taxon B Description
Peromyscus polionotus albifrons (mainland light colored coat)	

	Taxon B #8	Latin Name
Peromyscus polionotus subgriseus (https://www.gephbase.org/search-criteria?/and+Taxon+and+Synonyms=%Peromyscus+polionotus+subgriseus%#gephbase-summary-title)		
-	Common Name	
-	Synonyms	
-	Rank	
subspecies		Lineage
cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Deuterostomia; Chordata; Craniata; Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Sarcopterygii; Dipnotetrapodomorpha; Tetrapoda; Amniota; Mammalia; Theria; Eutheria; Boreoeutheria; Euarchontoglires; Glires; Rodentia; Myomorpha; Muroidea; Cricetidae; Neotominae; Peromyscus; Peromyscus polionotus		
Peromyscus polionotus (oldfield mouse) - (Rank: species) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=42413)	Parent	
369710 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=369710)		NCBI Taxonomy ID
Yes		is Taxon B an Infraspecies?
Peromyscus polionotus subgriseus (mainland dark colored coat)	Taxon B Description	

GENOTYPIC CHANGE

Asip	Generic Gene Name	UniProtKB Mus musculus
As; ASP; A<y>; ASIP; a	Synonyms	GenebankID or UniProtKB
10090.ENSMUSP00000029123 (http://string-db.org/newstring_cgi/show_network_section.pl?identifier=10090.ENSMUSP00000029123)	String	
-	Sequence Similarities	
GO:0031779 : melanocortin receptor binding (https://www.ebi.ac.uk/QuickGO/term/GO:0031779)	GO - Molecular Function	
GO:0031781 : type 3 melanocortin receptor binding (https://www.ebi.ac.uk/QuickGO/term/GO:0031781)		
GO:0031782 : type 4 melanocortin receptor binding (https://www.ebi.ac.uk/QuickGO/term/GO:0031782)		
GO:0008343 : adult feeding behavior (https://www.ebi.ac.uk/QuickGO/term/GO:0008343)	GO - Biological Process	
GO:0006091 : generation of precursor metabolites and energy (https://www.ebi.ac.uk/QuickGO/term/GO:0006091)		
GO:0071514 : genetic imprinting (https://www.ebi.ac.uk/QuickGO/term/GO:0071514)		
GO:0009755 : hormone-mediated signaling pathway (https://www.ebi.ac.uk/QuickGO/term/GO:0009755)		
GO:0042438 : melanin biosynthetic process (https://www.ebi.ac.uk/QuickGO/term/GO:0042438)		
GO:0032438 : melanosome organization (https://www.ebi.ac.uk/QuickGO/term/GO:0032438)		
GO:0032402 : melanosome transport (https://www.ebi.ac.uk/QuickGO/term/GO:0032402)		
GO:0043473 : pigmentation (https://www.ebi.ac.uk/QuickGO/term/GO:0043473)		
GO:0048023 : positive regulation of melanin biosynthetic process (https://www.ebi.ac.uk/QuickGO/term/GO:0048023)		
GO:0040030 : regulation of molecular function, epigenetic (https://www.ebi.ac.uk/QuickGO/term/GO:0040030)		
GO:0005576 : extracellular region (https://www.ebi.ac.uk/QuickGO/term/GO:0005576)	GO - Cellular Component	
GO:0005623 : cell (https://www.ebi.ac.uk/QuickGO/term/GO:0005623)		
No (https://www.gephbase.org/search-criteria?/and+Presumptive+Null=%No%#gephbase-summary-title)		Presumptive Null
Cis-regulatory (https://www.gephbase.org/search-criteria?/and+Molecular+Type=%Cis-regulatory%#gephbase-summary-title)		Molecular Type
Unknown (https://www.gephbase.org/search-criteria?/and+Aberration+Type=%Unknown%#gephbase-summary-title)		Aberration Type
		Molecular Details of the Mutation

"A closer investigation of this region revealed three SNPs significantly associated with pigment variation, spanning 1,756 bp, in strong linkage disequilibrium (mean $r^2 = 0.85$). A single SNP on chromosome 4 (chr4) at position chr4: 9,845,301 showed a markedly stronger association with pPC1 than the other two (Fig. 3B). This SNP is located between two untranslated exons (exons 1D and 1E), is 120 bp upstream of a cluster of Short Interspersed Nuclear Elements (SINE) in reverse orientation relative to the transcription of Agouti, and is 5,641 bp upstream of the first coding exon (exon 2)."

"Next, we employ an association-mapping approach to identify an ~1/42-kb previously uncharacterized noncoding region of Agouti associated with color variation. We then show that this 2-kb region can drive dermal expression in *Mus* embryos, demonstrating its regulatory activity in the skin during the establishment of pigmentation."

Experimental Evidence

Linkage Mapping (<https://www.gephebase.org/search-criteria/?and+Experimental%20Evidence=%20Linkage%20Mapping%23gephebase-summary-title>)

Main Reference

The developmental role of Agouti in color pattern evolution. (2011) (<https://pubmed.ncbi.nlm.nih.gov/21350176>)

Authors

Manceau M; Domingues VS; Mallarino R; Hoekstra HE

Abstract

Animal color patterns can affect fitness in the wild; however, little is known about the mechanisms that control their formation and subsequent evolution. We took advantage of two locally camouflaged populations of *Peromyscus* mice to show that the negative regulator of adult pigmentation, Agouti, also plays a key developmental role in color pattern evolution. Genetic and functional analyses showed that ventral-specific embryonic expression of Agouti establishes a prepattern by delaying the terminal differentiation of ventral melanocytes. Moreover, a skin-specific increase in both the level and spatial domain of Agouti expression prevents melanocyte maturation in a regionalized manner, resulting in a novel and adaptive color pattern. Thus, natural selection favors late-acting, tissue-specific changes in embryonic Agouti expression to produce large changes in adult color pattern.

Additional References

An enhancer of Agouti contributes to parallel evolution of cryptically colored beach mice. (2022) (<https://pubmed.ncbi.nlm.nih.gov/35776547>)

RELATED GEPHE

Related Genes

No matches found.

Related Haplotypes

No matches found.

EXTERNAL LINKS

COMMENTS

@parallelism