GEPHE SUMMARY

Gephebase Gene
Agouti

GephelD
GP00001974

Entry Status
Published

Main curator
Courtier

PHENOTYPIC CHANGE

Trait Category
Morphology

Trait
Coloration (coat)

Trait State in Taxon A
Peromyscus maniculatus - Nebraska Sand Hills - dark coat

Trait State in Taxon B
Peromyscus maniculatus - Nebraska Sand Hills - light coat

Ancestral State
Data not curated

Taxonomic Status
Intraspecific

Taxon A

Latin Name
Peromyscus maniculatus

Common Name
North American deer mouse

Synonyms
North American deer mouse; Peromyscus maniculatus (Wagner, 1845); MSB Mamm 74965; MSB:collector:Mamm:74965; Peromyscus maniculatis

Rank
species

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

Parent
Peromyscus () - (Rank: genus)

NCBI Taxonomy ID
10042

is Taxon A an Infraspecies?
Yes

Taxon A Description
Peromyscus maniculatus - Nebraska Sand Hills

Taxon B

Latin Name
Peromyscus maniculatus

Common Name
North American deer mouse

Synonyms
North American deer mouse; Peromyscus maniculatus (Wagner, 1845); MSB Mamm 74965; MSB:collector:Mamm:74965; Peromyscus maniculatis

Rank
species

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

Parent
Peromyscus () - (Rank: genus)

NCBI Taxonomy ID
10042

is Taxon B an Infraspecies?
Yes

Taxon B Description
Peromyscus maniculatus - Nebraska Sand Hills

GENOTYPIC CHANGE

Generic Gene Name
Asip

Synonyms
As; ASP; A<y>; ASIP; a

String
10090.ENSMUSP00000029123

Sequence Similarities
-

GO - Molecular Function
GO:0031779 : melanocortin receptor binding
GO:0031781 : type 3 melanocortin receptor binding
GO:0031782 : type 4 melanocortin receptor binding

GO - Biological Process
GO:0008343 : adult feeding behavior
GO:0006091 : generation of precursor metabolites and energy

UniProtKB Mus musculus
Q03288

GenebankID or UniProtKB
ACV72059

GO:0071514 : genetic imprinting
GO:0009755 : hormone-mediated signaling pathway
GO:0042438 : melanin biosynthetic process
GO:0032438 : melanosome organization
GO:0032402 : melanosome transport
GO:0043473 : pigmentation
GO:0048023 : positive regulation of melanin biosynthetic process
GO:0040030 : regulation of molecular function, epigenetic

GO - Cellular Component
GO:0005576 : extracellular region
GO:0005623 : cell

Mutation #1
Presumptive Null
No

Molecular Type
Cis-regulatory

Aberration Type
Unknown

Molecular Details of the Mutation
several candidate mutations (SNPs and deletion of Ser in exon 2) associated with tail stripe coloration

Experimental Evidence
Association Mapping

Main Reference
Adaptive evolution of multiple traits through multiple mutations at a single gene. (2013)

Authors
Linnen CR; Poh YP; Peterson BK; Barrett RD; Larson JG; Jensen JD; Hoekstra HE

Abstract
The identification of precise mutations is required for a complete understanding of the underlying molecular and evolutionary mechanisms driving adaptive phenotypic change. Using plasticine models in the field, we show that the light coat color of deer mice that recently colonized the light-colored soil of the Nebraska Sand Hills provides a strong selective advantage against visually hunting predators. Color variation in an admixed population suggests that this light Sand Hills phenotype is composed of multiple traits. We identified distinct regions within the Agouti locus associated with each color trait and found that only haplotypes associated with light trait values have evidence of selection. Thus, local adaptation is the result of independent selection on many mutations within a single locus, each with a specific effect on an adaptive phenotype, thereby minimizing pleiotropic consequences.

Additional References
Linking a mutation to survival in wild mice. (2019)

Mutation #2
Presumptive Null
No

Molecular Type
Cis-regulatory

Aberration Type
SNP

Molecular Details of the Mutation
several candidate SNPs associated with dorso-ventral boundary of coloration

Experimental Evidence
Association Mapping

Main Reference
Adaptive evolution of multiple traits through multiple mutations at a single gene. (2013)

Authors
Linnen CR; Poh YP; Peterson BK; Barrett RD; Larson JG; Jensen JD; Hoekstra HE

Abstract
The identification of precise mutations is required for a complete understanding of the underlying molecular and evolutionary mechanisms driving adaptive phenotypic change. Using plasticine models in the field, we show that the light coat color of deer mice that recently colonized the light-colored soil of the Nebraska Sand Hills provides a strong selective advantage against visually hunting predators. Color variation in an admixed population suggests that this light Sand Hills phenotype is composed of multiple traits. We identified distinct regions within the Agouti locus associated with each color trait and found that only haplotypes associated with light trait values have evidence of selection. Thus, local adaptation is the result of independent selection on many mutations within a single locus, each with a specific effect on an adaptive phenotype, thereby minimizing pleiotropic consequences.

Additional References
Linking a mutation to survival in wild mice. (2019)

Mutation #3
Presumptive Null
No

Molecular Type
Cis-regulatory

Aberration Type
SNP

Molecular Details of the Mutation
several candidate SNPs associated with dorsal brightness

Experimental Evidence
Association Mapping

Main Reference
Adaptive evolution of multiple traits through multiple mutations at a single gene. (2013)

Authors
Linnen CR; Poh YP; Peterson BK; Barrett RD; Larson JG; Jensen JD; Hoekstra HE

Abstract
The identification of precise mutations is required for a complete understanding of the underlying molecular and evolutionary mechanisms driving adaptive phenotypic change. Using plasticine models in the field, we show that the light coat color of deer mice that recently colonized the light-colored soil of the Nebraska Sand Hills provides a strong selective advantage against visually hunting predators. Color variation in an admixed population suggests that this light Sand Hills phenotype is composed of multiple traits. We identified distinct regions within the Agouti locus associated with each color trait and found that only haplotypes associated with light trait values have evidence of selection. Thus, local adaptation is the result of independent selection on many mutations within a single locus, each with a specific effect on an adaptive phenotype, thereby minimizing pleiotropic consequences.

Additional References
Linking a mutation to survival in wild mice. (2019)

Mutation #4
Presumptive Null
No

Molecular Type
Cis-regulatory

Aberration Type
SNP

Molecular Details of the Mutation
one candidate SNP associated with dorsal hue

Experimental Evidence
Association Mapping

Main Reference
Adaptive evolution of multiple traits through multiple mutations at a single gene. (2013)

Authors
Linnen CR; Poh YP; Peterson BK; Barrett RD; Larson JG; Jensen JD; Hoekstra HE

Abstract
The identification of precise mutations is required for a complete understanding of the underlying molecular and evolutionary mechanisms driving adaptive phenotypic change. Using plasticine models in the field, we show that the light coat color of deer mice that recently colonized the light-colored soil of the Nebraska Sand Hills provides a strong selective advantage against visually hunting predators. Color variation in an admixed population suggests that this light Sand Hills phenotype is composed of multiple traits. We identified distinct regions within the Agouti locus associated with each color trait and found that only haplotypes associated with light trait values have evidence of selection. Thus, local adaptation is the result of independent selection on many mutations within a single locus, each with a specific effect on an adaptive phenotype, thereby minimizing pleiotropic consequences.

Additional References
Linking a mutation to survival in wild mice. (2019)

Mutation #5
Presumptive Null
No

Molecular Type
Coding

Aberration Type
Deletion

Deletion Size
1-9 bp

Molecular Details of the Mutation
Deletion in exon 2 leading to a Ser deletion causes causes lighter coat colour via changes in protein binding properties ; as demonstrated by transgenic mice with either Peromyscus alleles (Barrett et al. 2019)

Experimental Evidence
Association Mapping

Main Reference
Adaptive evolution of multiple traits through multiple mutations at a single gene. (2013)

Authors
Linnen CR; Poh YP; Peterson BK; Barrett RD; Larson JG; Jensen JD; Hoekstra HE

Abstract
The identification of precise mutations is required for a complete understanding of the underlying molecular and evolutionary mechanisms driving adaptive phenotypic change. Using plasticine models in the field, we show that the light coat color of deer mice that recently colonized the light-colored soil of the Nebraska Sand Hills provides a strong selective advantage against visually hunting predators. Color variation in an admixed population suggests that this light Sand Hills phenotype is composed of multiple traits. We identified distinct regions within the Agouti locus associated with each color trait and found that only haplotypes associated with light trait values have evidence of selection. Thus, local adaptation is the result of independent selection on many mutations within a single locus, each with a specific effect on an adaptive phenotype, thereby minimizing pleiotropic consequences.

Additional References
Linking a mutation to survival in wild mice. (2019)

RELATED GEPHE

Related Genes

No matches found.

Related Haplotypes

2

EXTERNAL LINKS

COMMENTS

@SeveralMutationsWithEffect @Fitness