

GEPHE SUMMARY

Agouti (https://www.gephebase.org/search-criteria?/and+Gene+Gephebase+Agouti+Gephebase-summary-title)	Gephebase Gene	GP00002335	GepheID
Published	Entry Status	Martin	Main curator

PHENOTYPIC CHANGE

Morphology (https://www.gephebase.org/search-criteria?/and+Trait+Category+Morphology+Gephebase-summary-title)	Trait Category		
Coloration (coat) (https://www.gephebase.org/search-criteria?/and+Trait+Coloration+coat+Gephebase-summary-title)	Trait		
WT	Trait State in Taxon A		
melanic	Trait State in Taxon B		
Taxon A	Ancestral State		
Intraspecific (https://www.gephebase.org/search-criteria?/and+Taxonomic+Status+Intraspecific+Gephebase-summary-title)	Taxonomic Status		
	Taxon A	Taxon B	
Sciurus niger (https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms+Sciurus+niger+Gephebase-summary-title)	Latin Name	Sciurus niger (https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms+Sciurus+niger+Gephebase-summary-title)	Latin Name
fox squirrel	Common Name	fox squirrel	Common Name
fox squirrel; eastern fox squirrel	Synonyms	fox squirrel; eastern fox squirrel	Synonyms
species	Rank	species	Rank
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; Sciuromorpha; Sciuridae; Sciurinae; Sciurini; Sciurus	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; Sciuromorpha; Sciuridae; Sciurinae; Sciurini; Sciurus	Lineage
Sciurus () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=10001)	Parent	Sciurus () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=10001)	Parent
34861 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=34861)	NCBI Taxonomy ID	34861 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=34861)	NCBI Taxonomy ID
No	is Taxon A an Intraspecies?	No	is Taxon B an Intraspecies?

GENOTYPIC CHANGE

-	Generic Gene Name	()	UniProtKB
-	Synonyms		GenebankID or UniProtKB Mus musculus
-	String	Q03288 (https://www.ncbi.nlm.nih.gov/nuccore/Q03288)	
-	Sequence Similarities		
-	GO - Molecular Function		
-	GO - Biological Process		
-	GO - Cellular Component		
-			Presumptive Null
No (https://www.gephebase.org/search-criteria?/and+Presumptive+Null+No+Gephebase-summary-title)			Molecular Type
Coding (https://www.gephebase.org/search-criteria?/and+Molecular+Type+Coding+Gephebase-summary-title)			

SNP ([https://www.gephebase.org/search-criteria?/and+Aberration+Type="+SNP+"#gephebase-summary-title](https://www.gephebase.org/search-criteria?/and+Aberration+Type=))

SNP Coding Change

Nonsynonymous

Molecular Details of the Mutation

Gly121Cys

Experimental Evidence

Candidate Gene ([https://www.gephebase.org/search-criteria?/and+Experimental+Evidence="+Candidate+Gene+"#gephebase-summary-title](https://www.gephebase.org/search-criteria?/and+Experimental+Evidence=))

	Taxon A	Taxon B	Position
Codon	-	-	-
Amino-acid	Gly	Cys	121

Main Reference

Multiple origins of melanism in two species of North American tree squirrel (*Sciurus*). (2019) (<https://pubmed.ncbi.nlm.nih.gov/31296164>)

Authors

McRobie HR; Moncrief ND; Mundy NI

Abstract

While our understanding of the genetic basis of convergent evolution has improved there are still many uncertainties. Here we investigate the repeated evolution of dark colouration (melanism) in eastern fox squirrels (*Sciurus niger*; hereafter "fox squirrels") and eastern gray squirrels (*S. carolinensis*; hereafter "gray squirrels").

We show that convergent evolution of melanism has arisen by independent genetic mechanisms in two populations of the fox squirrel. In a western population, melanism is associated with a 24â€bp deletion in the melanocortin-1-receptor gene (MC1R⁻²⁴ allele), whereas in a south-eastern population, melanism is associated with a point substitution in the agouti signalling protein gene causing a Gly121Cys mutation. The MC1R⁺²⁴ allele is also associated with melanism in gray squirrels, and, remarkably, all the MC1R⁺²⁴ haplotypes are identical in the two species. Evolutionary analyses show that the MC1R⁺²⁴ haplotype is more closely related to other MC1R haplotypes in the fox squirrel than in the gray squirrel. Modelling supports the possibility of gene flow between the two species.

The presence of the MC1R⁺²⁴ allele and melanism in gray squirrels is likely due to introgression from fox squirrels, although we cannot completely rule out alternative hypotheses including introgression from gray squirrels to fox squirrels, or an ancestral polymorphism. Convergent melanism in these two species of tree squirrels has evolved by at least two and probably three different evolutionary routes.

Additional References

RELATED GEPHE

Related Genes

1 (MC1R) ([https://www.gephebase.org/search-criteria?/or+Taxon+ID="+34861+"/and+Trait=Coloration/and+groupHaplotypes=true#gephebase-summary-title](https://www.gephebase.org/search-criteria?/or+Taxon+ID=))

Related Haplotypes

No matches found.

EXTERNAL LINKS

COMMENTS