

GEPHE SUMMARY

Agouti (https://www.gephebase.org/search-criteria?/and+Gene+Gephebase+Agouti#gephebase-summary-title)	Gephebase Gene	GP00001732	GepheID
Published	Entry Status	Courtier	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		
kodkod	Trait State in Taxon A		
kodkod - melanistic	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	
Leopardus guigna (https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms+Leopardus+guigna#gephebase-summary-title)	Latin Name	Leopardus guigna (https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms+Leopardus+guigna#gephebase-summary-title)	Latin Name
Kodkod	Common Name	Kodkod	Common Name
Oncifelis guigna; Kodkod	Synonyms	Oncifelis guigna; Kodkod	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; Laurasiatheria; Carnivora; Feliformia; Felidae; Felinae; Leopardus	Lineage	cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Deuterostomia; Chordata; Craniata; Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Sarcopterygii; Dipnotetrapodomorpha; Tetrapoda; Amniota; Mammalia; Theria; Eutheria; Boreoeutheria; Laurasiatheria; Carnivora; Feliformia; Felidae; Felinae; Leopardus	Lineage
Leopardus () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=46841)	Parent	Leopardus () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=46841)	Parent
61386 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=61386)	NCBI Taxonomy ID	61386 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=61386)	NCBI Taxonomy ID
No	is Taxon A an Intraspecies?	No	is Taxon B an Intraspecies?

GENOTYPIC CHANGE

Asip	Generic Gene Name	Q03288 (http://www.uniprot.org/uniprot/Q03288)	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 - Biological Process		

GO:0008343 : adult feeding behavior
 (https://www.ebi.ac.uk/QuickGO/term/GO:0008343)
 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 - Cellular Component

GO:0005576 : extracellular region (https://www.ebi.ac.uk/QuickGO/term/GO:0005576)
 GO:0005623 : cell (https://www.ebi.ac.uk/QuickGO/term/GO:0005623)

Presumptive Null

Yes (https://www.gephebase.org/search-criteria?/and+Presumptive Null=^Yes^#gephebase-summary-title)

Molecular Type

Coding (https://www.gephebase.org/search-criteria?/and+Molecular Type=^Coding^#gephebase-summary-title)

Aberration Type

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

SNP Coding Change

Nonsynonymous

Molecular Details of the Mutation

Cys to Tyr substitution in ASIP (p.C126Y) which affects the key disulfide bond that stabilizes the RFF loop

Experimental Evidence

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

	Taxon A	Taxon B	Position
Codon	-	-	-
Amino-acid	Cys	Tyr	126

Main Reference

Recurrent evolution of melanism in South American felids. (2015) (https://pubmed.ncbi.nlm.nih.gov/25695801)

Authors

Schneider A; Henegar C; Day K; Absher D; Napolitano C; Silveira L; David VA; O'Brien SJ; Menotti-Raymond M; Barsh GS; Eizirik E

Abstract

Morphological variation in natural populations is a genomic test bed for studying the interface between molecular evolution and population genetics, but some of the most interesting questions involve non-model organisms that lack well annotated reference genomes. Many felid species exhibit polymorphism for melanism but the relative roles played by genetic drift, natural selection, and interspecies hybridization remain uncertain. We identify mutations of Agouti signaling protein (ASIP) or the Melanocortin 1 receptor (MC1R) as independent causes of melanism in three closely related South American species: the pampas cat (*Leopardus colocolo*), the kodkod (*Leopardus guigna*), and Geoffroy's cat (*Leopardus geoffroyi*). To assess population level variation in the regions surrounding the causative mutations we apply genomic resources from the domestic cat to carry out clone-based capture and targeted resequencing of 299 kb and 251 kb segments that contain ASIP and MC1R, respectively, from 54 individuals (13-21 per species), achieving enrichment of ~500-2500-fold and ~150x coverage. Our analysis points to unique evolutionary histories for each of the three species, with a strong selective sweep in the pampas cat, a distinctive but short melanism-specific haplotype in the Geoffroy's cat, and reduced nucleotide diversity for both ancestral and melanism-bearing chromosomes in the kodkod. These results reveal an important role for natural selection in a trait of longstanding interest to ecologists, geneticists, and the lay community, and provide a platform for comparative studies of morphological variation in other natural populations.

Additional References

RELATED GEPHE

No matches found.

Related Genes

No matches found.

Related Haplotypes

EXTERNAL LINKS

COMMENTS

