

GEPHE SUMMARY

	Gephebase Gene	GepheID
RNASE4 [likely pseudo-replicate of other RNASE4 entry by introgression] (https://www.gephebase.org/search-criteria?/and+Gene+Gephebase=~RNASE4 [likely pseudo-replicate of other RNASE4 entry by introgression] ~#gephebase-summary-title)	GP00001506	
	Prigent	Main curator
Published	Entry Status	

PHENOTYPIC CHANGE

	Trait Category		
Physiology (https://www.gephebase.org/search-criteria?/and+Trait Category=~Physiology ~#gephebase-summary-title)		Trait	
High-altitude adaptation (enhanced angiogenesis) (https://www.gephebase.org/search-criteria?/and+Trait=~High-altitude adaptation (enhanced angiogenesis) ~#gephebase-summary-title)			
	Trait State in Taxon A		
Snub-nosed monkey of lowland regions (R. brelichi)		Trait State in Taxon B	
Snub-nosed monkey of high-altitude habitats (R. roxellana)			
	Ancestral State		
Taxon A		Taxonomic Status	
Interspecific (https://www.gephebase.org/search-criteria?/and+Taxonomic Status=~Interspecific ~#gephebase-summary-title)			
	Taxon A		Taxon B
	Latin Name		Latin Name
Rhinopithecus brelichi (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=~Rhinopithecus brelichi ~#gephebase-summary-title)		Rhinopithecus roxellana (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=~Rhinopithecus roxellana ~#gephebase-summary-title)	
	Common Name		Common Name
Gray snub-nosed monkey		golden snub-nosed monkey	
	Synonyms		Synonyms
Pygathrix brelichi; Gray snub-nosed monkey		Pygathrix roxellana; golden snub-nosed monkey; Rhinopithecus roxellana (Milne-Edwards, 1870); Rhinopithecus roxellanae	
	Rank		Rank
species		species	
	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; Primates; Haplorrhini; Simiiformes; Catarrhini; Cercopithecoidea; Cercopithecidae; Colobinae; Rhinopithecus		cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Deuterostomia; Chordata; Craniata; Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Sarcopterygii; Dipnotetrapodomorpha; Tetrapoda; Amniota; Mammalia; Theria; Eutheria; Boreoeutheria; Euarchontoglires; Primates; Haplorrhini; Simiiformes; Catarrhini; Cercopithecoidea; Cercopithecidae; Colobinae; Rhinopithecus	
	Parent		Parent
Rhinopithecus () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=542827)		Rhinopithecus () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=542827)	
	NCBI Taxonomy ID		NCBI Taxonomy ID
224329 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=224329)		61622 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=61622)	
	is Taxon A an Intraspecies?		is Taxon B an Intraspecies?
No		No	

GENOTYPIC CHANGE

	Generic Gene Name	UniProtKB Homo sapiens
RNASE4		P34096 (http://www.uniprot.org/uniprot/P34096)
	Synonyms	GenebankID or UniProtKB
RAB1; RNS4		XM_010377080.1 (https://www.ncbi.nlm.nih.gov/nucleotide/XM_010377080.1)
	String	
9606.ENSPO0000381081 (http://string-db.org/newstring.cgi/show_network_section.pl?identifier=9606.ENSPO0000381081)		
	Sequence Similarities	
Belongs to the pancreatic ribonuclease family.		
	GO - Molecular Function	
GO:0003676 : nucleic acid binding (https://www.ebi.ac.uk/QuickGO/term/GO:0003676)		
GO:0004522 : ribonuclease A activity (https://www.ebi.ac.uk/QuickGO/term/GO:0004522)		

GO:0004540 : ribonuclease activity (<https://www.ebi.ac.uk/QuickGO/term/GO:0004540>)
GO - Biological Process
GO:0006379 : mRNA cleavage (<https://www.ebi.ac.uk/QuickGO/term/GO:0006379>)
GO - Cellular Component
GO:0005576 : extracellular region (<https://www.ebi.ac.uk/QuickGO/term/GO:0005576>)

Mutation #1

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>)

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

p.Asn89Lys & p.Thr128Ile

Experimental Evidence

Association Mapping (<https://www.gephebase.org/search-criteria?/and+Experimental Evidence=^Association Mapping^#gephebase-summary-title>)

	Taxon A	Taxon B	Position
Codon	-	-	-
Amino-acid	Asn	Lys	89

Main Reference

Genomic analysis of snub-nosed monkeys (*Rhinopithecus*) identifies genes and processes related to high-altitude adaptation. (2016) (<https://pubmed.ncbi.nlm.nih.gov/27399969>)

Authors

Yu L; Wang GD; Ruan J; Chen YB; Yang CP; Cao X; Wu H; Liu YH; Du ZL; Wang XP; Yang J; Cheng SC; Zhong L; Wang L; Wang X; Hu JY; Fang L; Bai B; Wang KL; Yuan N; Wu SF; Li BG; Zhang JG; Yang YQ; Zhang CL; Long YC; Li HS; Yang JY; Irwin DM; Ryder OA; Li Y; Wu CI; Zhang YP

Abstract

The snub-nosed monkey genus *Rhinopithecus* includes five closely related species distributed across altitudinal gradients from 800 to 4,500 m. *Rhinopithecus bieti*, *Rhinopithecus roxellana*, and *Rhinopithecus strykeri* inhabit high-altitude habitats, whereas *Rhinopithecus brelichi* and *Rhinopithecus avunculus* inhabit lowland regions. We report the de novo whole-genome sequence of *R. bieti* and genomic sequences for the four other species. Eight shared substitutions were found in six genes related to lung function, DNA repair, and angiogenesis in the high-altitude snub-nosed monkeys. Functional assays showed that the high-altitude variant of CDT1 (Ala537Val) renders cells more resistant to UV irradiation, and the high-altitude variants of RNASE4 (Asn89Lys and Thr128Ile) confer enhanced ability to induce endothelial tube formation in vitro. Genomic scans in the *R. bieti* and *R. roxellana* populations identified signatures of selection between and within populations at genes involved in functions relevant to high-altitude adaptation. These results provide valuable insights into the adaptation to high altitude in the snub-nosed monkeys.

Additional References

Mutation #2

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>)

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

p.Asn89Lys & p.Thr128Ile

Experimental Evidence

Association Mapping (<https://www.gephebase.org/search-criteria?/and+Experimental Evidence=^Association Mapping^#gephebase-summary-title>)

	Taxon A	Taxon B	Position
Codon	-	-	-
Amino-acid	Thr	Ile	128

Main Reference

Genomic analysis of snub-nosed monkeys (*Rhinopithecus*) identifies genes and processes related to high-altitude adaptation. (2016) (<https://pubmed.ncbi.nlm.nih.gov/27399969>)

Authors

Yu L; Wang GD; Ruan J; Chen YB; Yang CP; Cao X; Wu H; Liu YH; Du ZL; Wang XP; Yang J; Cheng SC; Zhong L; Wang L; Wang X; Hu JY; Fang L; Bai B; Wang KL; Yuan N; Wu SF; Li BG; Zhang JG; Yang YQ; Zhang CL; Long YC; Li HS; Yang JY; Irwin DM; Ryder OA; Li Y; Wu CI; Zhang YP

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into the adaptation to high altitude in the snub-nosed monkeys.

Additional References

RELATED GEPHE

No matches found.

Related Genes

No matches found.

Related Haplotypes

EXTERNAL LINKS

COMMENTS

@Introgression. Common substitution observed in high-altitude snub-nosed monkeys, identified as evolving under positive selection along the lineage containing *R. bieti* and *R. strykeri* and the lineage leading to *R. roxellana*. RNASE4 has been reported to induce angiogenesis. Variant RNASE4 (Asn89Lys and Thr128Ile) showed higher activity in inducing tube formation in human umbilical vein endothelial cell (HUVEC) cultures in Matrigel than reference RNASE4.