

GEPHE SUMMARY

RNASE4 (https://www.gephebase.org/search-criteria?/and+GeneGephebase=^RNASE4^#gephebase-summary-title)	Gephebase Gene	GP00001505	GepheID
	Entry Status	Prigent	Main curator
	Published		

PHENOTYPIC CHANGE

Physiology (https://www.gephebase.org/search-criteria?/and+TraitCategory=^Physiology^#gephebase-summary-title)		Trait Category	
High-altitude adaptation (enhanced angiogenesis) (https://www.gephebase.org/search-criteria?/and+Trait=^High-altitude adaptation (enhanced angiogenesis)^#gephebase-summary-title)		Trait	
Snub-nosed monkey of lowland regions (R. avunculus)		Trait State in Taxon A	
Snub-nosed monkey of high-altitude habitats (R. strykeri & R. bieti)		Trait State in Taxon B	
Taxon A		Ancestral State	
Interspecific (https://www.gephebase.org/search-criteria?/and+TaxonomicStatus=^Interspecific^#gephebase-summary-title)		Taxonomic Status	
Taxon A		Taxon B #1	
Rhinopithecus avunculus (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=^Rhinopithecus avunculus^#gephebase-summary-title)		Rhinopithecus strykeri (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=^Rhinopithecus strykeri^#gephebase-summary-title)	
Tonkin snub-nosed monkey		Burmese snub-nosed monkey	
Pygathrix avunculus; Tonkin snub-nosed monkey; Dollman’s snub-nosed monkey; Rhinopithecus avunculus (Dollman, 1912)		Burmese snub-nosed monkey; Myanmar snub-nosed monkey; Rhinopithecus strykeri Geissmann et al., 2010	
species		species	
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	
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)	
66062 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 66062)		1194336 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 1194336)	
No		No	
		Taxon B #2	
		Rhinopithecus bieti (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=^Rhinopithecus bieti^#gephebase-summary-title)	
		black snub-nosed monkey	
		Pygathrix bieti; black snub-nosed monkey	
		species	
		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	
		Rhinopithecus () - (Rank: genus)	

(<https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 542827>)

NCBI Taxonomy ID

61621

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is Taxon B an Intraspecies?

No

GENOTYPIC CHANGE

RNASE4

RAB1; RNS4

9606.ENSPO0000381081
(http://string-db.org/newstring.cgi/show_network_section.pl?identifier=9606.ENSPO0000381081)

Generic Gene Name

Synonyms

String

P34096 (<http://www.uniprot.org/uniprot/P34096>)

XM_017868534.1 (https://www.ncbi.nlm.nih.gov/nucore/XM_017868534.1)

UniProtKB Homo sapiens

GenebankID or UniProtKB

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

No (<https://www.gephebase.org/search-criteria?/and+Presumptive Null=~No~#gephebase-summary-title>)

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>)

Nonsynonymous

p.Asn89Lys & p.Thr128Ile

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

Presumptive Null

Molecular Type

Aberration Type

SNP Coding Change

Molecular Details of the Mutation

Experimental Evidence

	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

No (<https://www.gephebase.org/search-criteria?/and+Presumptive Null=~No~#gephebase-summary-title>)

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>)

Presumptive Null

Molecular Type

Aberration Type

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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Additional References

RELATED GEPHE

No matches found.

Related Genes

No matches found.

Related Haplotypes

EXTERNAL LINKS

COMMENTS

@SeveralMutationsWithEffect 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; 1 ?g/ml concentration) showed higher activity in inducing tube formation in human umbilical vein endothelial cell (HUV EC) cultures in Matrigel than reference RNASE4.