

GEPHE SUMMARY

<p>DNA replication factor CDT1 [[likely pseudo-replicate of other CDT1 entry by introgression]] (<a +dna+replication+factor+cdt1+[[likely+pseudo-replicate+of+other+cdt1+entry+by+introgression]]"="" href="https://www.gephebase.org/search-criteria?/and+Gene+Gephebase=">#gephebase-summary-title)</p> <p>Published</p>	<p>Gephebase Gene</p> <p>GP00001508</p> <p>Prigent</p> <p>Entry Status</p>	<p>GepheID</p> <p>Main curator</p>
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PHENOTYPIC CHANGE

<p>Physiology (<a +physiology"="" href="https://www.gephebase.org/search-criteria?/and+Trait+Category=">#gephebase-summary-title)</p> <p>Resistance to UV irradiation (<a +resistance+to+uv+irradiation"="" href="https://www.gephebase.org/search-criteria?/and+Trait=">#gephebase-summary-title)</p> <p>Snub-nosed monkey of lowland regions (R. brelichi)</p> <p>Snub-nosed monkey of high-altitude habitats (R. roxellana)</p> <p>Taxon A</p> <p>Interspecific (<a +interspecific"="" href="https://www.gephebase.org/search-criteria?/and+Taxonomic+Status=">#gephebase-summary-title)</p>	<p>Trait Category</p> <p>Trait</p> <p>Trait State in Taxon A</p> <p>Trait State in Taxon B</p> <p>Ancestral State</p> <p>Taxonomic Status</p>	<p>Taxon A</p> <p>Rhinopithecus brelichi (<a +rhinopithecus+brelichi"="" href="https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=">#gephebase-summary-title)</p> <p>Gray snub-nosed monkey</p> <p>Pygathrix brelichi; Gray snub-nosed monkey</p> <p>species</p> <p>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</p> <p>Rhinopithecus () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=542827)</p> <p>224329 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=224329)</p> <p>No</p>	<p>Latin Name</p> <p>Common Name</p> <p>Synonyms</p> <p>Rank</p> <p>Lineage</p> <p>Parent</p>	<p>Taxon B</p> <p>Rhinopithecus roxellana (<a +rhinopithecus+roxellana"="" href="https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=">#gephebase-summary-title)</p> <p>golden snub-nosed monkey</p> <p>Pygathrix roxellana; golden snub-nosed monkey; Rhinopithecus roxellana (Milne-Edwards, 1870); Rhinopithecus roxellanae</p> <p>species</p> <p>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</p> <p>Rhinopithecus () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=542827)</p> <p>61622 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=61622)</p> <p>No</p>	<p>Latin Name</p> <p>Common Name</p> <p>Synonyms</p> <p>Rank</p> <p>Lineage</p> <p>Parent</p>
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GENOTYPIC CHANGE

<p>CDT1</p> <p>DUP; RIS2</p> <p>9606.ENSPO0000301019 (http://string-db.org/newstring.cgi/show_network_section.pl?identifier=9606.ENSPO0000301019)</p>	<p>Generic Gene Name</p> <p>Synonyms</p> <p>String</p> <p>Sequence Similarities</p> <p>GO - Molecular Function</p>	<p>UniProtKB Homo sapiens</p> <p>Q9H211 (http://www.uniprot.org/uniprot/Q9H211)</p> <p>GenebankID or UniProtKB</p> <p>XM_010355653.1 (https://www.ncbi.nlm.nih.gov/nucore/XM_010355653.1)</p>
<p>Belongs to the Cdt1 family.</p> <p>GO:0003677 : DNA binding (https://www.ebi.ac.uk/QuickGO/term/GO:0003677)</p> <p>GO:0003682 : chromatin binding (https://www.ebi.ac.uk/QuickGO/term/GO:0003682)</p> <p>GO:0070182 : DNA polymerase binding</p>	<p>GO - Molecular Function</p>	

(<https://www.ebi.ac.uk/QuickGO/term/GO:0070182>)

GO - Biological Process

- GO:0051301 : cell division (<https://www.ebi.ac.uk/QuickGO/term/GO:0051301>)
- GO:0000082 : G1/S transition of mitotic cell cycle (<https://www.ebi.ac.uk/QuickGO/term/GO:0000082>)
- GO:0000278 : mitotic cell cycle (<https://www.ebi.ac.uk/QuickGO/term/GO:0000278>)
- GO:0000076 : DNA replication checkpoint (<https://www.ebi.ac.uk/QuickGO/term/GO:0000076>)
- GO:0007059 : chromosome segregation (<https://www.ebi.ac.uk/QuickGO/term/GO:0007059>)
- GO:0006260 : DNA replication (<https://www.ebi.ac.uk/QuickGO/term/GO:0006260>)
- GO:0000083 : regulation of transcription involved in G1/S transition of mitotic cell cycle (<https://www.ebi.ac.uk/QuickGO/term/GO:0000083>)
- GO:0051315 : attachment of mitotic spindle microtubules to kinetochore (<https://www.ebi.ac.uk/QuickGO/term/GO:0051315>)
- GO:1902426 : deactivation of mitotic spindle assembly checkpoint (<https://www.ebi.ac.uk/QuickGO/term/GO:1902426>)
- GO:0071163 : DNA replication preinitiation complex assembly (<https://www.ebi.ac.uk/QuickGO/term/GO:0071163>)
- GO:0051383 : kinetochore organization (<https://www.ebi.ac.uk/QuickGO/term/GO:0051383>)
- GO:0000281 : mitotic cytokinesis (<https://www.ebi.ac.uk/QuickGO/term/GO:0000281>)
- GO:1905341 : negative regulation of protein localization to kinetochore (<https://www.ebi.ac.uk/QuickGO/term/GO:1905341>)
- GO:0035563 : positive regulation of chromatin binding (<https://www.ebi.ac.uk/QuickGO/term/GO:0035563>)
- GO:0045740 : positive regulation of DNA replication (<https://www.ebi.ac.uk/QuickGO/term/GO:0045740>)
- GO:2000105 : positive regulation of DNA-dependent DNA replication (<https://www.ebi.ac.uk/QuickGO/term/GO:2000105>)
- GO:2001178 : positive regulation of mediator complex assembly (<https://www.ebi.ac.uk/QuickGO/term/GO:2001178>)
- GO:0031334 : positive regulation of protein complex assembly (<https://www.ebi.ac.uk/QuickGO/term/GO:0031334>)
- GO:1905342 : positive regulation of protein localization to kinetochore (<https://www.ebi.ac.uk/QuickGO/term/GO:1905342>)
- GO:0033044 : regulation of chromosome organization (<https://www.ebi.ac.uk/QuickGO/term/GO:0033044>)
- GO:1902595 : regulation of DNA replication origin binding (<https://www.ebi.ac.uk/QuickGO/term/GO:1902595>)
- GO:0030174 : regulation of DNA-dependent DNA replication initiation (<https://www.ebi.ac.uk/QuickGO/term/GO:0030174>)
- GO:0033262 : regulation of nuclear cell cycle DNA replication (<https://www.ebi.ac.uk/QuickGO/term/GO:0033262>)
- GO:0072708 : response to sorbitol (<https://www.ebi.ac.uk/QuickGO/term/GO:0072708>)

GO - Cellular Component

- GO:0005829 : cytosol (<https://www.ebi.ac.uk/QuickGO/term/GO:0005829>)
- GO:0005654 : nucleoplasm (<https://www.ebi.ac.uk/QuickGO/term/GO:0005654>)
- GO:0005634 : nucleus (<https://www.ebi.ac.uk/QuickGO/term/GO:0005634>)
- GO:0016604 : nuclear body (<https://www.ebi.ac.uk/QuickGO/term/GO:0016604>)
- GO:0000777 : condensed chromosome kinetochore (<https://www.ebi.ac.uk/QuickGO/term/GO:0000777>)
- GO:0000776 : kinetochore (<https://www.ebi.ac.uk/QuickGO/term/GO:0000776>)

Presumptive Null

No ([#gpepbase-summary-title](https://www.gephebase.org/search-criteria?/and+Presumptive+Null+No))

Molecular Type

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

Aberration Type

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

SNP Coding Change

Nonsynonymous

Molecular Details of the Mutation

p.Ala537Val

Experimental Evidence

Association Mapping ([#gpepbase-summary-title](https://www.gephebase.org/search-criteria?/and+Experimental+Evidence+Association+Mapping))

	Taxon A	Taxon B	Position
Codon	-	-	-
Amino-acid	-	-	-

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

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](#)

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*. Experimental validation: UV irradiation assays showed that CDT1 Ala537Val was more stable than the reference CDT1 protein after irradiation with 100 J/m² UV light. CDT1 is a licensing factor for DNA replication that is tightly controlled to maintain genome integrity and the encoded protein is rapidly degraded by the SCF Skp2 complex upon UV-induced DNA damage