GEPHE SUMMARY

Gephebase Gene
TAS2R16 (https://www.gephebase.org/search-criteria?/and+Gene Gephebase=^TAS2R16^#gephebase-summary-title)

GepheID
GP00001956

Entry Status
Published

Main curator
Courtier

PHENOTYPIC CHANGE

Trait Category
Behavior, Physiology (https://www.gephebase.org/search-criteria?/and+Trait Category=^Behavior^/and+Trait Category=^Physiology^#gephebase-summary-title)

Trait
Taste sensitivity (bitter) (https://www.gephebase.org/search-criteria?/and+Trait=^Taste sensitivity (bitter)^#gephebase-summary-title)

Trait State in Taxon A
TAS2R16 recognizes arbutin as an inverse agonist and possibly exhibits constitutive activity

Trait State in Taxon B
TAS2R16 regained the ability to recognize arbutin as an agonist

Ancestral State
Taxon A

Taxonomic Status
Intergeneric or Higher (https://www.gephebase.org/search-criteria?/and+Taxonomic Status=^Intergeneric or Higher^#gephebase-summary-title)

Taxon A #1

Latin Name
Varecia variegata (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=^Varecia variegata^#gephebase-summary-title)

Common Name
ruffed lemur

Synonyms
Lemur variegatus; ruffed lemur; variegated lemur

Rank
species

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; Strepsirrhini; Lemuriformes; Lemuridae; Varecia

Parent
Varecia () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 9454)

NCBI Taxonomy ID
9455 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 9455)

is Taxon A an Infraspecies?
No

Taxon A #2

Latin Name
Eulemur macaco (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=^Eulemur macaco^#gephebase-summary-title)

Common Name
black lemur

Synonyms
Lemur macaco; Petterus macaco; black lemur; Eulemur macaco (Linnaeus, 1766)

Rank
species

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; Strepsirrhini; Lemuriformes; Lemuridae; Eulemur

Parent
Eulemur () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 13513)

Taxon B

Latin Name
Lemur catta (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=^Lemur catta^#gephebase-summary-title)

Common Name
Ring-tailed lemur

Synonyms
Ring-tailed lemur

Rank
species

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; Strepsirrhini; Lemuriformes; Lemuridae; Lemur

Parent
Lemur () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 9446)

NCBI Taxonomy ID
9447 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 9447)

is Taxon B an Infraspecies?
No

NCBI Taxonomy ID

30602
(https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 30602)

is Taxon A an Infraspecies?

No

Taxon A #3

Latin Name

Eulemur flavifrons
(https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=^Eulemur flavifrons^#gephebase-summary-title)

Common Name

Sclater's lemur

Synonyms

Eulemur macaco flavifrons; Sclater's lemur; Eulemur flavifrons Gray, 1867

Rank

species

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; Strepsirrhini; Lemuriformes; Lemuridae; Eulemur

Parent

Eulemur () - (Rank: genus)
(https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 13513)

NCBI Taxonomy ID

87288
(https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 87288)

is Taxon A an Infraspecies?

No

Taxon A #4

Latin Name

Eulemur fulvus
(https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=^Eulemur fulvus^#gephebase-summary-title)

Common Name

brown lemur

Synonyms

Lemur fulvus; Petterus fulvus; brown lemur

Rank

species

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; Strepsirrhini; Lemuriformes; Lemuridae; Eulemur

Parent

Eulemur () - (Rank: genus)
(https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 13513)

NCBI Taxonomy ID

13515
(https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 13515)

is Taxon A an Infraspecies?

No

GENOTYPIC CHANGE

Generic Gene Name

-

Synonyms

-

String

-

Sequence Similarities

-

GO - Molecular Function

UniProtKB

()

GenebankID or UniProtKB

()

-

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)

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

Ser282Leu TCG>TTG

Experimental Evidence

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

	Taxon A	Taxon B	Position
Codon	TCG	TTG	-
Amino-acid	Ser	Leu	-

Main Reference

A natural point mutation in the bitter taste receptor TAS2R16 causes inverse agonism of arbutin in lemur gustation. (2019) (https://pubmed.ncbi.nlm.nih.gov/31161904)

Authors

Itoigawa A; Hayakawa T; Suzuki-Hashido N; Imai H

Abstract

Bitter taste enables the detection of potentially harmful substances and is mediated by bitter taste receptors, TAS2Rs, in vertebrates. Few antagonists and inverse agonists of TAS2Rs have been identified, especially natural compounds. TAS2R16s in humans, apes and Old World monkeys (Catarrhini, Anthropoidea) recognize Î²-glucoside analogues as specific agonists. Here, we investigated responses of TAS2R16 to Î²-glucosides in non-anthropoid primates, namely lemurs (Lemuriformes, Strepsirrhini). Salicin acted as an agonist on lemur TAS2R16. Arbutin acted as an agonist in the ring-tailed lemur (Lemur catta) but as an inverse agonist in black lemur (Eulemur macaco) and black-and-white ruffed lemur (Varecia variegata). We identified a strepsirrhine-specific amino acid substitution responsible for the inverse agonism of arbutin. In a food preference test, salicin bitterness was inhibited by arbutin in the black lemur. Structural modelling revealed this locus was important for a rearrangement of the intracellular end of transmembrane helix 7 (TM7). Accordingly, arbutin is the first known natural inverse agonist of TAS2Rs, contributing to our understanding of receptor-ligand interactions and the molecular basis of the unique feeding habit diversification in lemurs. Furthermore, the identification of a causal point mutation suggests that TAS2R can acquire functional changes according to feeding habits and environmental conditions.

Additional References

RELATED GEPHE

Related Genes

No matches found.

Related Haplotypes

1 (https://www.gephebase.org/search-criteria?/or+Gene Gephebase=^TAS2R16^/and+Taxon ID=^9455^/or+Gene Gephebase=^TAS2R16^/and+Taxon ID=^30602^/or+Gene Gephebase=^TAS2R16^/and+Taxon ID=^87288^/or+Gene Gephebase=^TAS2R16^/and+Taxon ID=^13515^/or+Gene Gephebase=^TAS2R16^/and+Taxon ID=^9447^#gephebase-summary-title)

EXTERNAL LINKS

COMMENTS