GEPHE SUMMARY

Gephebase Gene

TAS1R1 (https://www.gephebase.org/search-criteria?/and+Gene Gephebase=^TAS1R1^#gephebase-summary-title)

GepheID

GP00001415

Entry Status

Published

Main curator

Courtier

PHENOTYPIC CHANGE

Trait Category

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

Trait

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

Trait State in Taxon A

-

Trait State in Taxon B

-

Ancestral State

Taxon A

Taxonomic Status

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

Taxon A

Latin Name

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

Common Name

polar bear

Synonyms

Thalarctos maritimus; polar bear; white bear

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; Laurasiatheria; Carnivora; Caniformia; Ursidae; Ursus

Parent

Ursus () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 9639)

NCBI Taxonomy ID

29073 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 29073)

is Taxon A an Infraspecies?

No

Taxon B

Latin Name

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

Common Name

lesser panda

Synonyms

lesser panda; red panda

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; Laurasiatheria; Carnivora; Caniformia; Ailuridae; Ailurus

Parent

Ailurus () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 9648)

NCBI Taxonomy ID

9649 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 9649)

is Taxon B an Infraspecies?

No

GENOTYPIC CHANGE

Generic Gene Name

Tas1r1

Synonyms

TR1; T1r1; Gpr70; Tr1

String

10090.ENSMUSP00000030792 (http://string-db.org/newstring_cgi/show_network_section.pl?identifier=10090.ENSMUSP00000030792)

Sequence Similarities

Belongs to the G-protein coupled receptor 3 family. TAS1R subfamily.

GO - Molecular Function

GO:0004930 : G protein-coupled receptor activity (https://www.ebi.ac.uk/QuickGO/term/GO:0004930)
GO:0008527 : taste receptor activity (https://www.ebi.ac.uk/QuickGO/term/GO:0008527)

GO - Biological Process

GO:0050917 : sensory perception of umami taste (https://www.ebi.ac.uk/QuickGO/term/GO:0050917)

GO - Cellular Component

UniProtKB Mus musculus

Q99PG6 (http://www.uniprot.org/uniprot/Q99PG6)

GenebankID or UniProtKB

()

GO:0005887 : integral component of plasma membrane
(https://www.ebi.ac.uk/QuickGO/term/GO:0005887)

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

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

Deletion Size

1-9 bp

Molecular Details of the Mutation

1bp deletion (deletion of a C) in the sixth exon;

Experimental Evidence

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

Main Reference

Comparative genomics reveals convergent evolution between the bamboo-eating giant and red pandas. (2017) (https://pubmed.ncbi.nlm.nih.gov/28096377)

Authors

Hu Y; Wu Q; Ma S; Ma T; Shan L; Wang X; Nie Y; Ning Z; Yan L; Xiu Y; Wei F

Abstract

Phenotypic convergence between distantly related taxa often mirrors adaptation to similar selective pressures and may be driven by genetic convergence. The giant panda (Ailuropoda melanoleuca) and red panda (Ailurus fulgens) belong to different families in the order Carnivora, but both have evolved a specialized bamboo diet and adaptive pseudothumb, representing a classic model of convergent evolution. However, the genetic bases of these morphological and physiological convergences remain unknown. Through de novo sequencing the red panda genome and improving the giant panda genome assembly with added data, we identified genomic signatures of convergent evolution. Limb development genes DYNC2H1 and PCNT have undergone adaptive convergence and may be important candidate genes for pseudothumb development. As evolutionary responses to a bamboo diet, adaptive convergence has occurred in genes involved in the digestion and utilization of bamboo nutrients such as essential amino acids, fatty acids, and vitamins. Similarly, the umami taste receptor gene TAS1R1 has been pseudogenized in both pandas. These findings offer insights into genetic convergence mechanisms underlying phenotypic convergence and adaptation to a specialized bamboo diet.

Additional References

RELATED GEPHE

Related Genes

No matches found.

Related Haplotypes

1 (https://www.gephebase.org/search-criteria?/or+Gene Gephebase=^TAS1R1^/and+Taxon ID=^29073^/or+Gene Gephebase=^TAS1R1^/and+Taxon ID=^9649^#gephebase-summary-title)

EXTERNAL LINKS

COMMENTS

TAS1R1 has become a pseudogene because of one nucleotide deletion in the sixth exon - as confirmed by Sanger sequencing of three additional individuals