GEPHE SUMMARY

Gephebase Gene

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

GepheID

GP00001307

Entry Status

Published

Main curator

Arnoult

PHENOTYPIC CHANGE

Trait Category

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

Trait

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

Trait State in Taxon A

Gallus gallus

Trait State in Taxon B

Calypte anna

Ancestral State

Taxon A

Taxonomic Status

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

Taxon A

Latin Name

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

Common Name

chicken

Synonyms

Gallus gallus domesticus; chicken; bantam; chickens

Rank

species

Lineage

cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Deuterostomia; Chordata; Craniata; Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Sarcopterygii; Dipnotetrapodomorpha; Tetrapoda; Amniota; Sauropsida; Sauria; Archelosauria; Archosauria; Dinosauria; Saurischia; Theropoda; Coelurosauria; Aves; Neognathae; Galloanserae; Galliformes; Phasianidae; Phasianinae; Gallus

Parent

Gallus () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 9030)

NCBI Taxonomy ID

9031 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 9031)

is Taxon A an Infraspecies?

No

Taxon B

Latin Name

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

Common Name

Anna's hummingbird

Synonyms

Anna's hummingbird

Rank

species

Lineage

cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Deuterostomia; Chordata; Craniata; Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Sarcopterygii; Dipnotetrapodomorpha; Tetrapoda; Amniota; Sauropsida; Sauria; Archelosauria; Archosauria; Dinosauria; Saurischia; Theropoda; Coelurosauria; Aves; Neognathae; Apodiformes; Trochilidae; Calypte

Parent

Calypte () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 9243)

NCBI Taxonomy ID

9244 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 9244)

is Taxon B an Infraspecies?

No

GENOTYPIC CHANGE

Generic Gene Name

T1R1

Synonyms

-

String

-

Sequence Similarities

Belongs to the G-protein coupled receptor 3 family.

GO - Molecular Function

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

GO - Biological Process

-

GO - Cellular Component

GO:0016021 : integral component of membrane (https://www.ebi.ac.uk/QuickGO/term/GO:0016021)
GO:0005886 : plasma membrane (https://www.ebi.ac.uk/QuickGO/term/GO:0005886)

UniProtKB Calypte anna

A0A088DBT6 (http://www.uniprot.org/uniprot/A0A088DBT6)

GenebankID or UniProtKB

KM091453 (https://www.ncbi.nlm.nih.gov/nuccore/KM091453)

Presumptive Null

Unknown (https://www.gephebase.org/search-criteria?/and+Presumptive Null=^Unknown^#gephebase-summary-title)

Molecular Type

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

Aberration Type

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

Molecular Details of the Mutation

unknown

Experimental Evidence

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

Main Reference

Sensory biology. Evolution of sweet taste perception in hummingbirds by transformation of the ancestral umami receptor. (2014) (https://pubmed.ncbi.nlm.nih.gov/25146290)

Authors

Baldwin MW; Toda Y; Nakagita T; O'Connell MJ; Klasing KC; Misaka T; Edwards SV; Liberles SD

Abstract

Sensory systems define an animal's capacity for perception and can evolve to promote survival in new environmental niches. We have uncovered a noncanonical mechanism for sweet taste perception that evolved in hummingbirds since their divergence from insectivorous swifts, their closest relatives. We observed the widespread absence in birds of an essential subunit (T1R2) of the only known vertebrate sweet receptor, raising questions about how specialized nectar feeders such as hummingbirds sense sugars. Receptor expression studies revealed that the ancestral umami receptor (the T1R1-T1R3 heterodimer) was repurposed in hummingbirds to function as a carbohydrate receptor. Furthermore, the molecular recognition properties of T1R1-T1R3 guided taste behavior in captive and wild hummingbirds. We propose that changing taste receptor function enabled hummingbirds to perceive and use nectar, facilitating the massive radiation of hummingbird species.

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Additional References

RELATED GEPHE

Related Genes

1 (TAS1R3) (https://www.gephebase.org/search-criteria?/or+Taxon ID=^9031^/and+Trait=Taste sensitivity/or+Taxon ID=^9244^/and+Trait=Taste sensitivity/and+groupHaplotypes=true#gephebase-summary-title)

Related Haplotypes

No matches found.

EXTERNAL LINKS

COMMENTS

Mutations in T1R3 also involved.