

GEPHE SUMMARY

Gephebase Gene
amylase

Entry Status
Published

GepheID
GP00001870

Main curator
Courtier

PHENOTYPIC CHANGE

Trait Category
Physiology

Trait
Starch processing

Trait State in Taxon A
Owl monkey and Marmoset

Trait State in Taxon B
Capuchin

Ancestral State
Taxon A

Taxonomic Status
Intergeneric or Higher

Taxon A #1

Latin Name
Aotus trivirgatus

Common Name
douroucouli

Synonyms
douroucouli; night monkey; northern night monkey; owl monkey

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; Haplorrhini; Simiiformes; Platyrrhini; Aotidae; Aotus

Parent
Aotus (night monkeys) - (Rank: genus)

NCBI Taxonomy ID
9505

is Taxon A an Intraspecies?
No

Taxon B

Latin Name
Cebus capucinus

Common Name
white-faced sapajou

Synonyms
white-faced sapajou; white-faced capuchin; white-throated capuchin

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; Haplorrhini; Simiiformes; Platyrrhini; Cebidae; Cebinae; Cebus

Parent
Cebus (capuchin monkeys) - (Rank: genus)

NCBI Taxonomy ID
9516

is Taxon B an Intraspecies?
No

Taxon A #2

Latin Name
Callithrix jacchus

Common Name
white-tufted-ear marmoset

Synonyms
Callithrix jacchus jacchus; white-tufted-ear marmoset; common marmoset; white ear-tufted marmoset

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; Haplorrhini; Simiiformes; Platyrrhini; Cebidae; Callitrichinae; Callithrix; Callithrix

Parent
Callithrix () - (Rank: subgenus)

NCBI Taxonomy ID
9483

is Taxon A an Intraspecies?

No

GENOTYPIC CHANGE

Generic Gene Name

Amy1

UniProtKB Mus musculus

P00687

Synonyms

Amy-1; Amy1a; C030014B17Rik; Amy-1-a

GenebankID or UniProtKB

String

10090.ENSMUSP00000070368

Sequence Similarities

Belongs to the glycosyl hydrolase 13 family.

GO - Molecular Function

GO:0004556 : alpha-amylase activity

GO:0103025 : alpha-amylase activity (releasing maltohexaose)

GO:0005509 : calcium ion binding

GO:0016160 : amylase activity

GO:0031404 : chloride ion binding

GO - Biological Process

GO:0009617 : response to bacterium

GO:0016052 : carbohydrate catabolic process

GO - Cellular Component

GO:0005615 : extracellular space

Presumptive Null

No

Molecular Type

Gene Amplification

Aberration Type

Insertion

Insertion Size

1-10 kb

Molecular Details of the Mutation

3-4 copies of the amylase gene; which coincides with increased levels of amylase activity in saliva

Experimental Evidence

Candidate Gene

Main Reference

Independent amylase gene copy number bursts correlate with dietary preferences in mammals. (2019)

Authors

Pajic P; Pavlidis P; Dean K; Neznanova L; Romano RA; Garneau D; Daugherty E; Globig A; Ruhl S; Gokcumen O

Abstract

The amylase gene (AMY), which codes for a starch-digesting enzyme in animals, underwent several gene copy number gains in humans (Perry et al., 2007), dogs (Axelsson et al., 2013), and mice (Schibler et al., 1982), possibly along with increased starch consumption during the evolution of these species. Here, we present comprehensive evidence for AMY copy number expansions that independently occurred in several mammalian species which consume diets rich in starch. We also provide correlative evidence that AMY gene duplications may be an essential first step for amylase to be expressed in saliva. Our findings underscore the overall importance of gene copy number amplification as a flexible and fast evolutionary mechanism that can independently occur in different branches of the phylogeny.

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Additional References

RELATED GEPHE

Related Genes

No matches found.

Related Haplotypes

No matches found.

EXTERNAL LINKS

COMMENTS

Only one genome of capuchin was investigated - @Parallelism in mice; humans; dogs; rats ; possibly @TE