GEPHE SUMMARY

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

GepheID
GP00001871

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

Trait State in Taxon A
Sooty Mangabet and Rhesus Monkey

Trait State in Taxon B
Baboon

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

Common Name
sooty mangabey

Synonyms
Cercocebus torquatus atys; sooty mangabey; Cercocebus atys (Audebert, 1797)

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; Catarrhini; Cercopithecoidea; Cercopithecidae; Cercopithecinae; Cercocebus

Parent
Cercocebus () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 9529)

NCBI Taxonomy ID
9531 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 9531)

is Taxon A an Infraspecies?
No

Taxon A #2

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

Common Name
Rhesus monkey

Synonyms
Rhesus monkey; rhesus macaque; rhesus macaques; rhesus monkeys; Macaca mulatta (Zimmermann, 1780)

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; Catarrhini; Cercopithecoidea; Cercopithecidae; Cercopithecinae; Macaca

Taxon B

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

Common Name
olive baboon

Synonyms
Anubis baboon; Papio cynocephalus anubis; Papio doguera; Papio hamadryas anubis; Papio hamadryas doguera; olive baboon; Doguera baboon; Kenya baboon; baboon; Papio anubis (Lesson, 1827)

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; Catarrhini; Cercopithecoidea; Cercopithecidae; Cercopithecinae; Papio

Parent
Papio (baboons) - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 9554)

NCBI Taxonomy ID
9555 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 9555)

is Taxon B an Infraspecies?
No

Parent

Macaca (macaques) - (Rank: genus)
(https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 9539)

NCBI Taxonomy ID

9544
(https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 9544)

is Taxon A an Infraspecies?

No

GENOTYPIC CHANGE

Generic Gene Name

Amy1

Synonyms

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

String

10090.ENSMUSP00000070368
(http://string-db.org/newstring_cgi/show_network_section.pl?identifier=
10090.ENSMUSP00000070368)

Sequence Similarities

Belongs to the glycosyl hydrolase 13 family.

GO - Molecular Function

GO:0004556 : alpha-amylase activity
(https://www.ebi.ac.uk/QuickGO/term/GO:0004556)
GO:0103025 : alpha-amylase activity (releasing maltohexaose)
(https://www.ebi.ac.uk/QuickGO/term/GO:0103025)
GO:0005509 : calcium ion binding (https://www.ebi.ac.uk/QuickGO/term/GO:0005509)
GO:0016160 : amylase activity (https://www.ebi.ac.uk/QuickGO/term/GO:0016160)
GO:0031404 : chloride ion binding (https://www.ebi.ac.uk/QuickGO/term/GO:0031404)

GO - Biological Process

GO:0009617 : response to bacterium (https://www.ebi.ac.uk/QuickGO/term/GO:0009617)
GO:0016052 : carbohydrate catabolic process
(https://www.ebi.ac.uk/QuickGO/term/GO:0016052)

GO - Cellular Component

GO:0005615 : extracellular space (https://www.ebi.ac.uk/QuickGO/term/GO:0005615)

UniProtKB Mus musculus

P00687 (http://www.uniprot.org/uniprot/P00687)

GenebankID or UniProtKB

()

Presumptive Null

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

Molecular Type

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

Aberration Type

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

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

Main Reference

Independent amylase gene copy number bursts correlate with dietary preferences in mammals. (2019) (https://pubmed.ncbi.nlm.nih.gov/31084707)

Authors

Pajic P; Pavlidis P; Dean K; Neznanova L; Romano RA; Garneau D; Daugherity 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 baboon was investigated - Papio hamadryas has not been checked (according to 2019 e-mail of Omer Gokcumen) @ParallelEvolution in mice; humans; dogs; rats