GEPHE SUMMARY

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

GepheID
GP00001867

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
Mus musculus

Trait State in Taxon B
Mus musculus

Ancestral State
Taxon A

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

Taxon A

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

Common Name
house mouse

Synonyms
house mouse; mouse; Mus musculus Linnaeus, 1758; mice C57BL/6xCBA/CaJ hybrid

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; Glires; Rodentia; Myomorpha; Muroidea; Muridae; Murinae; Mus; Mus

Parent
Mus () - (Rank: subgenus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 862507)

NCBI Taxonomy ID
10090 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 10090)

is Taxon A an Infraspecies?
No

Taxon B

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

Common Name
house mouse

Synonyms
house mouse; mouse; Mus musculus Linnaeus, 1758; mice C57BL/6xCBA/CaJ hybrid

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; Glires; Rodentia; Myomorpha; Muroidea; Muridae; Murinae; Mus; Mus

Parent
Mus () - (Rank: subgenus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 862507)

NCBI Taxonomy ID
10090 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 10090)

is Taxon B 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)

UniProtKB Mus musculus
P00687 (http://www.uniprot.org/uniprot/P00687)

GenebankID or UniProtKB
()

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)

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

Copy Number Variation

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.

Additional References

RELATED GEPHE

Related Genes

No matches found.

Related Haplotypes

No matches found.

EXTERNAL LINKS

COMMENTS

9â€“13 diploid copies of the amylase gene in brown rats and 6â€“7 copies in black rats and wood rats @ParallelEvolution in humans; dogs; rats boars @TEPossibly