

## GEPHE SUMMARY

<p>amylase (<a href="https://www.gephebase.org/search-criteria?/and+Gene+Gephebase=^amylase^#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Gene+Gephebase=^amylase^#gephebase-summary-title</a>)</p> <p>Published</p>	<p>Gephebase Gene</p> <p>Entry Status</p>	<p>GP00001868</p> <p>Courtier</p>	<p>GepheID</p> <p>Main curator</p>
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## PHENOTYPIC CHANGE

<p>Physiology (<a href="https://www.gephebase.org/search-criteria?/and+Trait+Category=^Physiology^#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Trait+Category=^Physiology^#gephebase-summary-title</a>)</p> <p>Starch processing (<a href="https://www.gephebase.org/search-criteria?/and+Trait=^Starch+processing^#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Trait=^Starch+processing^#gephebase-summary-title</a>)</p> <p>Rattus norvegicus</p> <p>Rattus norvegicus</p> <p>Taxon A</p> <p>Domesticated (<a href="https://www.gephebase.org/search-criteria?/and+Taxonomic+Status=^Domesticated^#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Taxonomic+Status=^Domesticated^#gephebase-summary-title</a>)</p>	<p>Trait Category</p> <p>Trait</p> <p>Trait State in Taxon A</p> <p>Trait State in Taxon B</p> <p>Ancestral State</p> <p>Taxonomic Status</p>	<p>Taxon A</p> <p>Taxon B</p>
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Taxon A	Latin Name	Taxon B	Latin Name
Rattus norvegicus ( <a href="https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=^Rattus+norvegicus^#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=^Rattus+norvegicus^#gephebase-summary-title</a> )	Rattus norvegicus ( <a href="https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=^Rattus+norvegicus^#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=^Rattus+norvegicus^#gephebase-summary-title</a> )	Rattus norvegicus ( <a href="https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=^Rattus+norvegicus^#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=^Rattus+norvegicus^#gephebase-summary-title</a> )	Rattus norvegicus ( <a href="https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=^Rattus+norvegicus^#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=^Rattus+norvegicus^#gephebase-summary-title</a> )
Common Name	Common Name	Common Name	Common Name
Norway rat	Norway rat	Norway rat	Norway rat
Synonyms	Synonyms	Synonyms	Synonyms
rat; rats; Norway rat; brown rat; Rattus norvegicus8; Rattus norvegicus species	rat; rats; Norway rat; brown rat; Rattus norvegicus8; Rattus norvegicus species	rat; rats; Norway rat; brown rat; Rattus norvegicus8; Rattus norvegicus species	rat; rats; Norway rat; brown rat; Rattus norvegicus8; Rattus norvegicus species
Rank	Rank	Rank	Rank
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; Rattus	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; Rattus	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; Rattus	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; Rattus
Parent	Parent	Parent	Parent
Rattus () - (Rank: genus) ( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=10114">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=10114</a> )	Rattus () - (Rank: genus) ( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=10114">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=10114</a> )	Rattus () - (Rank: genus) ( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=10114">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=10114</a> )	Rattus () - (Rank: genus) ( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=10114">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=10114</a> )
NCBI Taxonomy ID	NCBI Taxonomy ID	NCBI Taxonomy ID	NCBI Taxonomy ID
10116 ( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=10116">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=10116</a> )	10116 ( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=10116">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=10116</a> )	10116 ( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=10116">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=10116</a> )	10116 ( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=10116">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=10116</a> )
is Taxon A an Intraspecies?	is Taxon A an Intraspecies?	is Taxon B an Intraspecies?	is Taxon B an Intraspecies?
No	No	No	No

## GENOTYPIC CHANGE

<p>Amy1</p> <p>Amy-1; Amy1a; C030014B17Rik; Amy-1-a</p> <p>10090.ENSMUSP00000070368 (<a href="http://string-db.org/newstring.cgi/show_network_section.pl?identifier=10090.ENSMUSP00000070368">http://string-db.org/newstring.cgi/show_network_section.pl?identifier=10090.ENSMUSP00000070368</a>)</p> <p>Belongs to the glycosyl hydrolase 13 family.</p> <p>GO:0004556 : alpha-amylase activity (<a href="https://www.ebi.ac.uk/QuickGO/term/GO:0004556">https://www.ebi.ac.uk/QuickGO/term/GO:0004556</a>)</p> <p>GO:0103025 : alpha-amylase activity (releasing maltohexaose) (<a href="https://www.ebi.ac.uk/QuickGO/term/GO:0103025">https://www.ebi.ac.uk/QuickGO/term/GO:0103025</a>)</p> <p>GO:0005509 : calcium ion binding (<a href="https://www.ebi.ac.uk/QuickGO/term/GO:0005509">https://www.ebi.ac.uk/QuickGO/term/GO:0005509</a>)</p> <p>GO:0016160 : amylase activity (<a href="https://www.ebi.ac.uk/QuickGO/term/GO:0016160">https://www.ebi.ac.uk/QuickGO/term/GO:0016160</a>)</p> <p>GO:0031404 : chloride ion binding (<a href="https://www.ebi.ac.uk/QuickGO/term/GO:0031404">https://www.ebi.ac.uk/QuickGO/term/GO:0031404</a>)</p>	<p>Generic Gene Name</p> <p>Synonyms</p> <p>String</p> <p>Sequence Similarities</p> <p>GO - Molecular Function</p>	<p>P00687 (<a href="http://www.uniprot.org/uniprot/P00687">http://www.uniprot.org/uniprot/P00687</a>)</p> <p>()</p> <p>UniProtKB Mus musculus</p> <p>GenebankID or UniProtKB</p>
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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; 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

@ParallelEvolution in mice; humans; dogs; rats boars @TEPossibly