GEPHE SUMMARY

Gephebase Gene

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

Entry Status

Published

GepheID

GP00000654

Main curator

Martin

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

Canis lupus

Trait State in Taxon B

Canis familiaris

Ancestral State

Data not curated

Taxonomic Status

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

Taxon A

Latin Name

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

Common Name

gray wolf

Synonyms

gray wolf; grey wolf; Canis lupus Linnaeus, 1758

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; Laurasiatheria; Carnivora; Caniformia; Canidae; Canis

Parent

Canis () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 9611)

NCBI Taxonomy ID

9612 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 9612)

is Taxon A an Infraspecies?

No

Taxon B

Latin Name

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

Common Name

dog

Synonyms

Canis canis; Canis domesticus; Canis familiaris; dog; dogs; Canis familiaris Linnaeus, 1758; Canis lupus familiaris Linnaeus, 1758

Rank

subspecies

Lineage

cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Deuterostomia; Chordata; Craniata; Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Sarcopterygii; Dipnotetrapodomorpha; Tetrapoda; Amniota; Mammalia; Theria; Eutheria; Boreoeutheria; Laurasiatheria; Carnivora; Caniformia; Canidae; Canis; Canis lupus

Parent

Canis lupus (gray wolf) - (Rank: species) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 9612)

NCBI Taxonomy ID

9615 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 9615)

is Taxon B an Infraspecies?

No

GENOTYPIC CHANGE

Generic Gene Name

MGAM

Synonyms

MG; MGA; MGAML

String

9606.ENSP00000447378 (http://string-db.org/newstring_cgi/show_network_section.pl?identifier= 9606.ENSP00000447378)

Sequence Similarities

Belongs to the glycosyl hydrolase 31 family.

GO - Molecular Function

GO:0030246 : carbohydrate binding (https://www.ebi.ac.uk/QuickGO/term/GO:0030246)
GO:0003824 : catalytic activity (https://www.ebi.ac.uk/QuickGO/term/GO:0003824)
GO:0004558 : alpha-1,4-glucosidase activity (https://www.ebi.ac.uk/QuickGO/term/GO:0004558)
GO:0016160 : amylase activity (https://www.ebi.ac.uk/QuickGO/term/GO:0016160)
GO:0004339 : glucan 1,4-alpha-glucosidase activity

UniProtKB Homo sapiens

O43451 (http://www.uniprot.org/uniprot/O43451)

GenebankID or UniProtKB

KHN85505 (https://www.ncbi.nlm.nih.gov/nuccore/KHN85505)

(https://www.ebi.ac.uk/QuickGO/term/GO:0004339)
GO:0032450 : maltose alpha-glucosidase activity
(https://www.ebi.ac.uk/QuickGO/term/GO:0032450)

GO - Biological Process

GO:0043312 : neutrophil degranulation
(https://www.ebi.ac.uk/QuickGO/term/GO:0043312)
GO:0044245 : polysaccharide digestion
(https://www.ebi.ac.uk/QuickGO/term/GO:0044245)
GO:0005983 : starch catabolic process
(https://www.ebi.ac.uk/QuickGO/term/GO:0005983)

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)
GO:0016324 : apical plasma membrane
(https://www.ebi.ac.uk/QuickGO/term/GO:0016324)
GO:0070062 : extracellular exosome (https://www.ebi.ac.uk/QuickGO/term/GO:0070062)
GO:0101003 : ficolin-1-rich granule membrane
(https://www.ebi.ac.uk/QuickGO/term/GO:0101003)
GO:0070821 : tertiary granule membrane
(https://www.ebi.ac.uk/QuickGO/term/GO:0070821)

Presumptive Null

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

Molecular Type

Cis-regulatory (https://www.gephebase.org/search-criteria?/and+Molecular Type=^Cis-regulatory^#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

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

Main Reference

The genomic signature of dog domestication reveals adaptation to a starch-rich diet. (2013) (https://pubmed.ncbi.nlm.nih.gov/23354050)

Authors

Axelsson E; Ratnakumar A; Arendt ML; Maqbool K; Webster MT; Perloski M; Liberg O; Arnemo JM; Hedhammar A; Lindblad-Toh K

Abstract

The domestication of dogs was an important episode in the development of human civilization. The precise timing and location of this event is debated and little is known about the genetic changes that accompanied the transformation of ancient wolves into domestic dogs. Here we conduct whole-genome resequencing of dogs and wolves to identify 3.8 million genetic variants used to identify 36 genomic regions that probably represent targets for selection during dog domestication. Nineteen of these regions contain genes important in brain function, eight of which belong to nervous system development pathways and potentially underlie behavioural changes central to dog domestication. Ten genes with key roles in starch digestion and fat metabolism also show signals of selection. We identify candidate mutations in key genes and provide functional support for an increased starch digestion in dogs relative to wolves. Our results indicate that novel adaptations allowing the early ancestors of modern dogs to thrive on a diet rich in starch, relative to the carnivorous diet of wolves, constituted a crucial step in the early domestication of dogs.

Additional References

RELATED GEPHE

Related Genes

2 (amylase 2B (AMY2B), SGLT1) (https://www.gephebase.org/search-criteria?/or+Taxon ID=^9612^/and+Trait=Starch processing/or+Taxon ID=^9615^/and+Trait=Starch processing/and+groupHaplotypes=true#gephebase-summary-title)

Related Haplotypes

No matches found.

EXTERNAL LINKS

COMMENTS