

GEPHE SUMMARY

MGAM (https://www.gephebase.org/search-criteria?/and+GeneGephebase=~MGAM~#gephebase-summary-title)	Gephebase Gene	GP00000654	GepheID
	Entry Status	Martin	Main curator
	Published		

PHENOTYPIC CHANGE

Physiology (https://www.gephebase.org/search-criteria?/and+TraitCategory=~Physiology~#gephebase-summary-title)		Trait Category	
Starch processing (https://www.gephebase.org/search-criteria?/and+Trait=~Starchprocessing~#gephebase-summary-title)		Trait	
Canis lupus		Trait State in Taxon A	
Canis familiaris		Trait State in Taxon B	
Data not curated		Ancestral State	
Domesticated (https://www.gephebase.org/search-criteria?/and+TaxonomicStatus=~Domesticated~#gephebase-summary-title)		Taxonomic Status	
Taxon A		Taxon B	
Canis lupus (https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=~Canis+lupus~#gephebase-summary-title)		Canis lupus familiaris (https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=~Canis+lupus+familiaris~#gephebase-summary-title)	
gray wolf		dog	
gray wolf; grey wolf; Canis lupus Linnaeus, 1758		Canis canis; Canis domesticus; Canis familiaris; dog; dogs; Canis familiaris Linnaeus, 1758; Canis lupus familiaris Linnaeus, 1758	
species		subspecies	
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		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	
Canis () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=9611)		Canis lupus (gray wolf) - (Rank: species) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=9612)	
9612 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=9612)		9615 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=9615)	
No is Taxon A an Intraspecies?		No is Taxon B an Intraspecies?	

GENOTYPIC CHANGE

MGAM	Generic Gene Name	UniProtKB Homo sapiens
	Synonyms	O43451 (http://www.uniprot.org/uniprot/O43451)
	String	GenebankID or UniProtKB KHN85505 (https://www.ncbi.nlm.nih.gov/nuccore/KHN85505)
9606.ENSPP00000447378 (http://string-db.org/newstring.cgi/show_network_section.pl?identifier=9606.ENSPP00000447378)		
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		

(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