

GEPHE SUMMARY

Gephebase Gene		GepheID
Myosin heavy chain 9 (<a +myosin+heavy+chain+9+"#gephebase-summary-title"="" href="https://www.gephebase.org/search-criteria?/and+Gene+Gephebase=">https://www.gephebase.org/search-criteria?/and+Gene+Gephebase="+Myosin+heavy+chain+9+"#gephebase-summary-title)		GP00000684
Entry Status		Courtier
Published		

PHENOTYPIC CHANGE

Trait #1	Trait Category
Physiology (<a +physiology+"#gephebase-summary-title"="" href="https://www.gephebase.org/search-criteria?/and+Trait+Category=">https://www.gephebase.org/search-criteria?/and+Trait+Category="+Physiology+"#gephebase-summary-title)	
Heat tolerance (<a +heat+tolerance+"#gephebase-summary-title"="" href="https://www.gephebase.org/search-criteria?/and+Trait=">https://www.gephebase.org/search-criteria?/and+Trait="+Heat+tolerance+"#gephebase-summary-title)	
Trait State in Taxon A	
Canis familiaris - various breeds	
Trait State in Taxon B	
Canis familiaris - Alaskan racing dog	

Trait #2	Trait Category
Physiology (<a +physiology+"#gephebase-summary-title"="" href="https://www.gephebase.org/search-criteria?/and+Trait+Category=">https://www.gephebase.org/search-criteria?/and+Trait+Category="+Physiology+"#gephebase-summary-title)	
Racing performance (<a +racing+performance+"#gephebase-summary-title"="" href="https://www.gephebase.org/search-criteria?/and+Trait=">https://www.gephebase.org/search-criteria?/and+Trait="+Racing+performance+"#gephebase-summary-title)	
Trait State in Taxon A	
-	
Trait State in Taxon B	
-	

Ancestral State	
Taxon A	
Taxonomic Status	
Domesticated (<a +domesticated+"#gephebase-summary-title"="" href="https://www.gephebase.org/search-criteria?/and+Taxonomic+Status=">https://www.gephebase.org/search-criteria?/and+Taxonomic+Status="+Domesticated+"#gephebase-summary-title)	
Taxon A	Taxon B
Latin Name	Latin Name
Canis lupus (<a +canis+lupus+"#gephebase-summary-title"="" href="https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=">https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms="+Canis+lupus+"#gephebase-summary-title)	Canis lupus familiaris (<a +canis+lupus+familiaris+"#gephebase-summary-title"="" href="https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=">https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms="+Canis+lupus+familiaris+"#gephebase-summary-title)
Common Name	Common Name
gray wolf	dog
Synonyms	Synonyms
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
Rank	Rank
species	subspecies
Lineage	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	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	Parent
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)
NCBI Taxonomy ID	NCBI Taxonomy ID
9612	9615
(https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=9612)	(https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=9615)
is Taxon A an Intraspecies?	is Taxon B an Intraspecies?
No	Yes
Taxon B Description	
Canis familiaris - Alaskan racing dog	

GENOTYPIC CHANGE

GENOTYPIC CHANGE		Generic Gene Name	UniProtKB Homo sapiens
MYH9		P35579 (http://www.uniprot.org/uniprot/P35579)	
MHA; FTNS; EPSTS; BDPLT6; DFNA17; MATINS; NMMHCA; NMHC-II-A; MMMHC-IIA	Synonyms	GenebankID or UniProtKB	
	String	NP_001104237 (https://www.ncbi.nlm.nih.gov/nuccore/NP_001104237)	
9606.ENSPO0000216181 (http://string-db.org/newstring.cgi/show_network_section.pl?identifier=9606.ENSPO0000216181)			
	Sequence Similarities		
Belongs to the TRAFAC class myosin-kinesin ATPase superfamily. Myosin family.			
	GO - Molecular Function		
GO:0005524 : ATP binding (https://www.ebi.ac.uk/QuickGO/term/GO:0005524)			
GO:0042803 : protein homodimerization activity (https://www.ebi.ac.uk/QuickGO/term/GO:0042803)			
GO:0003723 : RNA binding (https://www.ebi.ac.uk/QuickGO/term/GO:0003723)			
GO:0043531 : ADP binding (https://www.ebi.ac.uk/QuickGO/term/GO:0043531)			
GO:0005516 : calmodulin binding (https://www.ebi.ac.uk/QuickGO/term/GO:0005516)			
GO:0045296 : cadherin binding (https://www.ebi.ac.uk/QuickGO/term/GO:0045296)			
GO:0003779 : actin binding (https://www.ebi.ac.uk/QuickGO/term/GO:0003779)			
GO:0005178 : integrin binding (https://www.ebi.ac.uk/QuickGO/term/GO:0005178)			
GO:0003774 : motor activity (https://www.ebi.ac.uk/QuickGO/term/GO:0003774)			
GO:0051015 : actin filament binding (https://www.ebi.ac.uk/QuickGO/term/GO:0051015)			
GO:0030898 : actin-dependent ATPase activity (https://www.ebi.ac.uk/QuickGO/term/GO:0030898)			
GO:0016887 : ATPase activity (https://www.ebi.ac.uk/QuickGO/term/GO:0016887)			
GO:0000146 : microfilament motor activity (https://www.ebi.ac.uk/QuickGO/term/GO:0000146)			
GO:0019904 : protein domain specific binding (https://www.ebi.ac.uk/QuickGO/term/GO:0019904)			
GO:0043495 : protein membrane anchor (https://www.ebi.ac.uk/QuickGO/term/GO:0043495)			
	GO - Biological Process		
GO:0001701 : in utero embryonic development (https://www.ebi.ac.uk/QuickGO/term/GO:0001701)			
GO:0008360 : regulation of cell shape (https://www.ebi.ac.uk/QuickGO/term/GO:0008360)			
GO:0001525 : angiogenesis (https://www.ebi.ac.uk/QuickGO/term/GO:0001525)			
GO:0050900 : leukocyte migration (https://www.ebi.ac.uk/QuickGO/term/GO:0050900)			
GO:0070527 : platelet aggregation (https://www.ebi.ac.uk/QuickGO/term/GO:0070527)			
GO:0007520 : myoblast fusion (https://www.ebi.ac.uk/QuickGO/term/GO:0007520)			
GO:0031532 : actin cytoskeleton reorganization (https://www.ebi.ac.uk/QuickGO/term/GO:0031532)			
GO:0030048 : actin filament-based movement (https://www.ebi.ac.uk/QuickGO/term/GO:0030048)			
GO:0031032 : actomyosin structure organization (https://www.ebi.ac.uk/QuickGO/term/GO:0031032)			
GO:0043534 : blood vessel endothelial cell migration (https://www.ebi.ac.uk/QuickGO/term/GO:0043534)			
GO:0032506 : cytokinetic process (https://www.ebi.ac.uk/QuickGO/term/GO:0032506)			
GO:0051295 : establishment of meiotic spindle localization (https://www.ebi.ac.uk/QuickGO/term/GO:0051295)			
GO:0001768 : establishment of T cell polarity (https://www.ebi.ac.uk/QuickGO/term/GO:0001768)			
GO:0007229 : integrin-mediated signaling pathway (https://www.ebi.ac.uk/QuickGO/term/GO:0007229)			
GO:0000212 : meiotic spindle organization (https://www.ebi.ac.uk/QuickGO/term/GO:0000212)			
GO:0006509 : membrane protein ectodomain proteolysis (https://www.ebi.ac.uk/QuickGO/term/GO:0006509)			
GO:0030224 : monocyte differentiation (https://www.ebi.ac.uk/QuickGO/term/GO:0030224)			
GO:1903919 : negative regulation of actin filament severing (https://www.ebi.ac.uk/QuickGO/term/GO:1903919)			
GO:0006911 : phagocytosis, engulfment (https://www.ebi.ac.uk/QuickGO/term/GO:0006911)			
GO:0030220 : platelet formation (https://www.ebi.ac.uk/QuickGO/term/GO:0030220)			
GO:1903923 : positive regulation of protein processing in phagocytic vesicle (https://www.ebi.ac.uk/QuickGO/term/GO:1903923)			
GO:0015031 : protein transport (https://www.ebi.ac.uk/QuickGO/term/GO:0015031)			
GO:0032796 : uropod organization (https://www.ebi.ac.uk/QuickGO/term/GO:0032796)			
	GO - Cellular Component		
GO:0005886 : plasma membrane (https://www.ebi.ac.uk/QuickGO/term/GO:0005886)			
GO:0015629 : actin cytoskeleton (https://www.ebi.ac.uk/QuickGO/term/GO:0015629)			
GO:0005737 : cytoplasm (https://www.ebi.ac.uk/QuickGO/term/GO:0005737)			

GO:0005829 : cytosol (<https://www.ebi.ac.uk/QuickGO/term/GO:0005829>)
GO:0005925 : focal adhesion (<https://www.ebi.ac.uk/QuickGO/term/GO:0005925>)
GO:0016020 : membrane (<https://www.ebi.ac.uk/QuickGO/term/GO:0016020>)
GO:0070062 : extracellular exosome (<https://www.ebi.ac.uk/QuickGO/term/GO:0070062>)
GO:0005634 : nucleus (<https://www.ebi.ac.uk/QuickGO/term/GO:0005634>)
GO:0032991 : protein-containing complex
(<https://www.ebi.ac.uk/QuickGO/term/GO:0032991>)
GO:0031594 : neuromuscular junction
(<https://www.ebi.ac.uk/QuickGO/term/GO:0031594>)
GO:0001725 : stress fiber (<https://www.ebi.ac.uk/QuickGO/term/GO:0001725>)
GO:0042641 : actomyosin (<https://www.ebi.ac.uk/QuickGO/term/GO:0042641>)
GO:0005826 : actomyosin contractile ring
(<https://www.ebi.ac.uk/QuickGO/term/GO:0005826>)
GO:0005903 : brush border (<https://www.ebi.ac.uk/QuickGO/term/GO:0005903>)
GO:0031252 : cell leading edge (<https://www.ebi.ac.uk/QuickGO/term/GO:0031252>)
GO:0005913 : cell-cell adherens junction
(<https://www.ebi.ac.uk/QuickGO/term/GO:0005913>)
GO:0032154 : cleavage furrow (<https://www.ebi.ac.uk/QuickGO/term/GO:0032154>)
GO:0001772 : immunological synapse
(<https://www.ebi.ac.uk/QuickGO/term/GO:0001772>)
GO:0016460 : myosin II complex (<https://www.ebi.ac.uk/QuickGO/term/GO:0016460>)
GO:0097513 : myosin II filament (<https://www.ebi.ac.uk/QuickGO/term/GO:0097513>)
GO:0001726 : ruffle (<https://www.ebi.ac.uk/QuickGO/term/GO:0001726>)
GO:0005819 : spindle (<https://www.ebi.ac.uk/QuickGO/term/GO:0005819>)
GO:0001931 : uropod (<https://www.ebi.ac.uk/QuickGO/term/GO:0001931>)

Presumptive Null

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

Molecular Type

Cis-regulatory (<https://www.gephebase.org/search-criteria?/and+Molecular+Type=~Cis-regulatory~#gephebase-summary-title>)

Aberration Type

SNP (<https://www.gephebase.org/search-criteria?/and+Aberration+Type=~SNP~#gephebase-summary-title>)

Molecular Details of the Mutation

Several candidate SNPs - exact causing mutation(s) unknown

Experimental Evidence

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

Main Reference

Breed-specific ancestry studies and genome-wide association analysis highlight an association between the MYH9 gene and heat tolerance in Alaskan sprint racing sled dogs. (2012)
(<https://pubmed.ncbi.nlm.nih.gov/22105876>)

Authors

Huson HJ; vonHoldt BM; Rimbault M; Byers AM; Runstadler JA; Parker HG; Ostrander EA

Abstract

Alaskan sled dogs are a genetically distinct population shaped by generations of selective interbreeding with purebred dogs to create a group of high-performance athletes. As a result of selective breeding strategies, sled dogs present a unique opportunity to employ admixture-mapping techniques to investigate how breed composition and trait selection impact genomic structure. We used admixture mapping to investigate genetic ancestry across the genomes of two classes of sled dogs, sprint and long-distance racers, and combined that with genome-wide association studies (GWAS) to identify regions that correlate with performance-enhancing traits. The sled dog genome is enhanced by differential contributions from four non-admixed breeds (Alaskan Malamute, Siberian Husky, German Shorthaired Pointer, and Borzoi). A principal components analysis (PCA) of 115,000 genome-wide SNPs clearly resolved the sprint and distance populations as distinct genetic groups, with longer blocks of linkage disequilibrium (LD) observed in the distance versus sprint dogs (7.5-10 and 2.5-3.75Å kb, respectively). Furthermore, we identified eight regions with the genomic signal from either a selective sweep or an association analysis, corroborated by an excess of ancestry when comparing sprint and distance dogs. A comparison of elite and poor-performing sled dogs identified a single region significantly associated with heat tolerance. Within the region we identified seven SNPs within the myosin heavy chain 9 gene (MYH9) that were significantly associated with heat tolerance in sprint dogs, two of which correspond to conserved promoter and enhancer regions in the human ortholog.

Additional References

RELATED GEPHE

Related Genes

1 (Myostatin (MSTN = GDF8)) (<https://www.gephebase.org/search-criteria?/or+Taxon+ID=~9612~/and+Trait=Heat+tolerance/or+Taxon+ID=~9612~/and+Trait=Racing+performance/or+Taxon+ID=~9615~/and+Trait=Heat+tolerance/or+Taxon+ID=~9615~/and+Trait=Racing+performance/and+groupHaplotypes=true#gephebase-summary-title>)

Related Haplotypes

No matches found.

EXTERNAL LINKS

COMMENTS

