

GEPHE SUMMARY

	Gephebase Gene	GP00000536	GephelD
LCORL (#gephebase-summary-title)	Entry Status	Martin	Main curator
Published			

PHENOTYPIC CHANGE

	Trait Category		
Morphology (#gephebase-summary-title)	Trait		
Body size (<a ?and+taxonomicstatus='^Domesticated"' href="https://www.gephebase.org/search-criteria/?and+Trait=^Body size^#gephebase-summary-title)</td><td>Trait State in Taxon A</td><td></td><td></td></tr> <tr> <td>Equus caballus</td><td>Trait State in Taxon B</td><td></td><td></td></tr> <tr> <td>Equus caballus (QTL study : used German Warmblood)</td><td>Ancestral State</td><td></td><td></td></tr> <tr> <td>Data not curated</td><td>Taxonomic Status</td><td></td><td></td></tr> <tr> <td>Domesticated (#gephebase-summary-title)			
Taxon A	Latin Name	Taxon B	Latin Name
Equus caballus (#gephebase-summary-title)	Common Name	Equus caballus (#gephebase-summary-title)	Common Name
horse	Synonyms	horse	Synonyms
Equus przewalskii f. caballus; Equus przewalskii forma caballus; horse; domestic horse; equine; Equus caballus Linnaeus, 1758		Equus przewalskii f. caballus; Equus przewalskii forma caballus; horse; domestic horse; equine; Equus caballus Linnaeus, 1758	
species	Rank	species	Rank
cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Deuterostomia; Chordata; Craniata; Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Sarcopterygii; Dipnotetrapodomorpha; Tetrapoda; Amniota; Mammalia; Theria; Eutheria; Boreoeutheria; Laurasiatheria; Perissodactyla; Equidae; Equus; Equus	Lineage	cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Deuterostomia; Chordata; Craniata; Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Sarcopterygii; Dipnotetrapodomorpha; Tetrapoda; Amniota; Mammalia; Theria; Eutheria; Boreoeutheria; Laurasiatheria; Perissodactyla; Equidae; Equus; Equus	Lineage
Equus () - (Rank: subgenus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 35510)	Parent	Equus () - (Rank: subgenus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 35510)	Parent
9796 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 9796)	NCBI Taxonomy ID	9796 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 9796)	NCBI Taxonomy ID
No	is Taxon A an Infraspecies?	Yes	is Taxon B an Infraspecies?
			Taxon B Description
			Equus caballus (QTL study : used German Warmblood)

GENOTYPIC CHANGE

	Generic Gene Name	UniProtKB Homo sapiens
LCORL	Synonyms	Q8N3X6 (http://www.uniprot.org/uniprot/Q8N3X6)
MLR1	String	GenebankID or UniProtKB AEQ00707 (https://www.ncbi.nlm.nih.gov/nuccore/AEQ00707)
9606.ENSP00000371661 (http://string-db.org/newstring_cgi/show_network_section.pl?identifier=9606.ENSP00000371661)	Sequence Similarities	
-	GO - Molecular Function GO:0003677 : DNA binding (https://www.ebi.ac.uk/QuickGO/term/GO:0003677) GO:0000981 : DNA-binding transcription factor activity, RNA polymerase II-specific (https://www.ebi.ac.uk/QuickGO/term/GO:0000981)	
	GO - Biological Process	

GO:0006366 : transcription by RNA polymerase II
(<https://www.ebi.ac.uk/QuickGO/term/GO:0006366>)

GO - Cellular Component

GO:0005634 : nucleus (<https://www.ebi.ac.uk/QuickGO/term/GO:0005634>)

Presumptive Null

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

Molecular Type

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

Aberration Type

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

Molecular Details of the Mutation

Not identified

Experimental Evidence

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

Main Reference

Four loci explain 83% of size variation in the horse. (2012) (<https://pubmed.ncbi.nlm.nih.gov/22808074>)

Authors

Makvandi-Nejad S; Hoffman GE; Allen JJ; Chu E; Gu E; Chandler AM; Loredo AI; Bellone RR; Mezey JG; Brooks SA; Sutter NB

Abstract

Horse body size varies greatly due to intense selection within each breed. American Miniatures are less than one meter tall at the withers while Shires and Percherons can exceed two meters. The genetic basis for this variation is not known. We hypothesize that the breed population structure of the horse should simplify efforts to identify genes controlling size. In support of this, here we show with genome-wide association scans (GWAS) that genetic variation at just four loci can explain the great majority of horse size variation. Unlike humans, which are naturally reproducing and possess many genetic variants with weak effects on size, we show that horses, like other domestic mammals, carry just a small number of size loci with alleles of large effect. Furthermore, three of our horse size loci contain the LCORL, HMGA2 and ZFAT genes that have previously been found to control human height. The LCORL/NCAPG locus is also implicated in cattle growth and HMGA2 is associated with dog size. Extreme size diversification is a hallmark of domestication. Our results in the horse, complemented by the prior work in cattle and dog, serve to pinpoint those very few genes that have played major roles in the rapid evolution of size during domestication.

Additional References

Expression levels of LCORL are associated with body size in horses. (2013) (<https://pubmed.ncbi.nlm.nih.gov/23418579>)

A genome-wide association study indicates LCORL/NCAPG as a candidate locus for withers height in German Warmblood horses. (2013) (<https://pubmed.ncbi.nlm.nih.gov/23418885>)

A genome-wide association study reveals loci influencing height and other conformation traits in horses. (2012) (<https://pubmed.ncbi.nlm.nih.gov/22615965>)

RELATED GEPHE

3 (aggrecan, B4GALT7, HMGA2) (<https://www.gephebase.org/search-criteria?/or+Taxon+ID=^9796^/and+Trait=Body+size/and+groupHaplotypes=true#gephebase-summary-title>)

Related Genes

Related Haplotypes

No matches found.

EXTERNAL LINKS

COMMENTS