GEPHE SUMMARY

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

GepheID
GP00000536

Entry Status
Published

Main curator
Martin

PHENOTYPIC CHANGE

Trait Category
Morphology (https://www.gephebase.org/search-criteria?/and+Trait Category=^Morphology^#gephebase-summary-title)

Trait
Body size (https://www.gephebase.org/search-criteria?/and+Trait=^Body size^#gephebase-summary-title)

Trait State in Taxon A
Equus caballus

Trait State in Taxon B
Equus caballus (QTL study : used German Warmblood)

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

Common Name
horse

Synonyms
Equus przewalskii f. caballus; Equus przewalskii forma caballus; horse; domestic horse; equine; Equus caballus 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; Perissodactyla; Equidae; Equus; Equus

Parent
Equus () - (Rank: subgenus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 35510)

NCBI Taxonomy ID
9796 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 9796)

is Taxon A an Infraspecies?
No

Taxon B

Latin Name
Equus caballus (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=^Equus caballus^#gephebase-summary-title)

Common Name
horse

Synonyms
Equus przewalskii f. caballus; Equus przewalskii forma caballus; horse; domestic horse; equine; Equus caballus 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; Perissodactyla; Equidae; Equus; Equus

Parent
Equus () - (Rank: subgenus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 35510)

NCBI Taxonomy ID
9796 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 9796)

is Taxon B an Infraspecies?
Yes

Taxon B Description
Equus caballus (QTL study : used German Warmblood)

GENOTYPIC CHANGE

Generic Gene Name
LCORL

Synonyms
MLR1

String
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

UniProtKB Homo sapiens
Q8N3X6 (http://www.uniprot.org/uniprot/Q8N3X6)

GenebankID or UniProtKB
AEQ00707 (https://www.ncbi.nlm.nih.gov/nuccore/AEQ00707)

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

Related Genes

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 Haplotypes

No matches found.

EXTERNAL LINKS

COMMENTS