

GEPHE SUMMARY

|                                                                                                                                                                                                                |                |            |              |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|------------|--------------|
| HAS2 ( <a href="https://www.gephebase.org/search-criteria?/and+GeneGephebase=~HAS2~#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+GeneGephebase=~HAS2~#gephebase-summary-title</a> ) | Gephebase Gene | GP00000438 | GepheID      |
|                                                                                                                                                                                                                | Entry Status   | Martin     | Main curator |
|                                                                                                                                                                                                                | Published      |            |              |

PHENOTYPIC CHANGE

|                                                                                                                                                                                                                                                                                                                               |  |                                                                                                                                                                                                                                                                                                                                            |  |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| Morphology ( <a href="https://www.gephebase.org/search-criteria?/and+TraitCategory=~Morphology~#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+TraitCategory=~Morphology~#gephebase-summary-title</a> )                                                                                              |  | Trait Category                                                                                                                                                                                                                                                                                                                             |  |
| Wrinkled skin (Shar-Pei dogs) ( <a href="https://www.gephebase.org/search-criteria?/and+Trait=~Wrinkled skin (Shar-Pei dogs)~#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Trait=~Wrinkled skin (Shar-Pei dogs)~#gephebase-summary-title</a> )                                                     |  | Trait                                                                                                                                                                                                                                                                                                                                      |  |
| Canis familiaris - various breeds                                                                                                                                                                                                                                                                                             |  | Trait State in Taxon A                                                                                                                                                                                                                                                                                                                     |  |
| Canis familiaris - various breeds                                                                                                                                                                                                                                                                                             |  | Trait State in Taxon B                                                                                                                                                                                                                                                                                                                     |  |
| Taxon A                                                                                                                                                                                                                                                                                                                       |  | Ancestral State                                                                                                                                                                                                                                                                                                                            |  |
| Domesticated ( <a href="https://www.gephebase.org/search-criteria?/and+TaxonomicStatus=~Domesticated~#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+TaxonomicStatus=~Domesticated~#gephebase-summary-title</a> )                                                                                    |  | Taxonomic Status                                                                                                                                                                                                                                                                                                                           |  |
| Taxon A                                                                                                                                                                                                                                                                                                                       |  | Taxon B                                                                                                                                                                                                                                                                                                                                    |  |
| Canis lupus ( <a href="https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=~Canis lupus~#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=~Canis lupus~#gephebase-summary-title</a> )                                                                                 |  | Canis lupus familiaris ( <a href="https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=~Canis lupus familiaris~#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=~Canis lupus familiaris~#gephebase-summary-title</a> )                                                             |  |
| 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) ( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 9611">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 9611</a> )                                                                                                                                                |  | Canis lupus (gray wolf) - (Rank: species) ( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 9612">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 9612</a> )                                                                                                                                            |  |
| 9612 ( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 9612">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 9612</a> )                                                                                                                                                                    |  | 9615 ( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 9615">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 9615</a> )                                                                                                                                                                                 |  |
| No is Taxon A an Intraspecies?                                                                                                                                                                                                                                                                                                |  | No is Taxon B an Intraspecies?                                                                                                                                                                                                                                                                                                             |  |

GENOTYPIC CHANGE

|                                                                                                                                                                                                                                       |                   |                                                                                                                                    |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|------------------------------------------------------------------------------------------------------------------------------------|
| HAS2                                                                                                                                                                                                                                  | Generic Gene Name | UniProtKB Canis lupus familiaris                                                                                                   |
|                                                                                                                                                                                                                                       | Synonyms          | J9PB16 ( <a href="http://www.uniprot.org/uniprot/J9PB16">http://www.uniprot.org/uniprot/J9PB16</a> )                               |
|                                                                                                                                                                                                                                       | String            | AAEX03008773 ( <a href="https://www.ncbi.nlm.nih.gov/nuccore/AAEX03008773">https://www.ncbi.nlm.nih.gov/nuccore/AAEX03008773</a> ) |
| 9615.ENSACFP00000042994 ( <a href="http://string-db.org/newstring.cgi/show_network_section.pl?identifier=9615.ENSACFP00000042994">http://string-db.org/newstring.cgi/show_network_section.pl?identifier=9615.ENSACFP00000042994</a> ) |                   |                                                                                                                                    |
| -                                                                                                                                                                                                                                     |                   |                                                                                                                                    |
| Sequence Similarities                                                                                                                                                                                                                 |                   |                                                                                                                                    |
| -                                                                                                                                                                                                                                     |                   |                                                                                                                                    |
| GO - Molecular Function                                                                                                                                                                                                               |                   |                                                                                                                                    |
| GO:0042802 : identical protein binding ( <a href="https://www.ebi.ac.uk/QuickGO/term/GO:0042802">https://www.ebi.ac.uk/QuickGO/term/GO:0042802</a> )                                                                                  |                   |                                                                                                                                    |
| GO:0050501 : hyaluronan synthase activity ( <a href="https://www.ebi.ac.uk/QuickGO/term/GO:0050501">https://www.ebi.ac.uk/QuickGO/term/GO:0050501</a> )                                                                               |                   |                                                                                                                                    |
| GO - Biological Process                                                                                                                                                                                                               |                   |                                                                                                                                    |
| GO:0008284 : positive regulation of cell proliferation                                                                                                                                                                                |                   |                                                                                                                                    |

(<https://www.ebi.ac.uk/QuickGO/term/GO:0008284>)  
GO:0071347 : cellular response to interleukin-1  
(<https://www.ebi.ac.uk/QuickGO/term/GO:0071347>)  
GO:0071356 : cellular response to tumor necrosis factor  
(<https://www.ebi.ac.uk/QuickGO/term/GO:0071356>)  
GO:0035810 : positive regulation of urine volume  
(<https://www.ebi.ac.uk/QuickGO/term/GO:0035810>)  
GO:0060349 : bone morphogenesis (<https://www.ebi.ac.uk/QuickGO/term/GO:0060349>)  
GO:0036302 : atrioventricular canal development  
(<https://www.ebi.ac.uk/QuickGO/term/GO:0036302>)  
GO:0071498 : cellular response to fluid shear stress  
(<https://www.ebi.ac.uk/QuickGO/term/GO:0071498>)  
GO:0036120 : cellular response to platelet-derived growth factor stimulus  
(<https://www.ebi.ac.uk/QuickGO/term/GO:0036120>)  
GO:0090500 : endocardial cushion to mesenchymal transition  
(<https://www.ebi.ac.uk/QuickGO/term/GO:0090500>)  
GO:0085029 : extracellular matrix assembly  
(<https://www.ebi.ac.uk/QuickGO/term/GO:0085029>)  
GO:0045226 : extracellular polysaccharide biosynthetic process  
(<https://www.ebi.ac.uk/QuickGO/term/GO:0045226>)  
GO:0030213 : hyaluronan biosynthetic process  
(<https://www.ebi.ac.uk/QuickGO/term/GO:0030213>)  
GO:0030335 : positive regulation of cell migration  
(<https://www.ebi.ac.uk/QuickGO/term/GO:0030335>)  
GO:1900625 : positive regulation of monocyte aggregation  
(<https://www.ebi.ac.uk/QuickGO/term/GO:1900625>)  
GO:0070295 : renal water absorption (<https://www.ebi.ac.uk/QuickGO/term/GO:0070295>)  
GO:0001570 : vasculogenesis (<https://www.ebi.ac.uk/QuickGO/term/GO:0001570>)

GO - Cellular Component

GO:0005737 : cytoplasm (<https://www.ebi.ac.uk/QuickGO/term/GO:0005737>)  
GO:0005887 : integral component of plasma membrane  
(<https://www.ebi.ac.uk/QuickGO/term/GO:0005887>)

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

Tracking footprints of artificial selection in the dog genome. (2010) (<https://pubmed.ncbi.nlm.nih.gov/20080661>)

Authors

Akey JM; Ruhe AL; Akey DT; Wong AK; Connelly CF; Madeoy J; Nicholas TJ; Neff MW

Abstract

The size, shape, and behavior of the modern domesticated dog has been sculpted by artificial selection for at least 14,000 years. The genetic substrates of selective breeding, however, remain largely unknown. Here, we describe a genome-wide scan for selection in 275 dogs from 10 phenotypically diverse breeds that were genotyped for over 21,000 autosomal SNPs. We identified 155 genomic regions that possess strong signatures of recent selection and contain candidate genes for phenotypes that vary most conspicuously among breeds, including size, coat color and texture, behavior, skeletal morphology, and physiology. In addition, we demonstrate a significant association between HAS2 and skin wrinkling in the Shar-Pei, and provide evidence that regulatory evolution has played a prominent role in the phenotypic diversification of modern dog breeds. Our results provide a first-generation map of selection in the dog, illustrate how such maps can rapidly inform the genetic basis of canine phenotypic variation, and provide a framework for delineating the mechanistic basis of how artificial selection promotes rapid and pronounced phenotypic evolution.

Additional References

RELATED GEPHE

Related Genes

No matches found.

Related Haplotypes

No matches found.

EXTERNAL LINKS

COMMENTS

