GEPHE SUMMARY

Gephebase Gene

GTF2I (https://www.gephebase.org/search-criteria?/and+Gene Gephebase=^GTF2I^#gephebase-summary-title)

GepheID

GP00002673

Entry Status

Draft

Main curator

Courtier

PHENOTYPIC CHANGE

Trait Category

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

Trait

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

Trait State in Taxon A

low sensibility to training

Trait State in Taxon B

high sensibility to training; human-directed canine hypersociability

Ancestral State

Taxon A

Taxonomic Status

Domesticated (https://www.gephebase.org/search-criteria?/and+Taxonomic Status=^Domesticated^#gephebase-summary-title)

Taxon A

Latin Name

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

Common Name

dog

Synonyms

Canis canis; Canis domesticus; Canis familiaris; dog; dogs; Canis familiaris Linnaeus, 1758; Canis lupus familiaris Linnaeus, 1758

Rank

subspecies

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; Canis lupus

Parent

Canis lupus (gray wolf) - (Rank: species) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 9612)

NCBI Taxonomy ID

9615 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 9615)

is Taxon A an Infraspecies?

No

Taxon B

Latin Name

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

Common Name

dog

Synonyms

Canis canis; Canis domesticus; Canis familiaris; dog; dogs; Canis familiaris Linnaeus, 1758; Canis lupus familiaris Linnaeus, 1758

Rank

subspecies

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; Canis lupus

Parent

Canis lupus (gray wolf) - (Rank: species) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 9612)

NCBI Taxonomy ID

9615 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 9615)

is Taxon B an Infraspecies?

No

GENOTYPIC CHANGE

Generic Gene Name

-

Synonyms

-

String

-

Sequence Similarities

-

GO - Molecular Function

-

GO - Biological Process

-

GO - Cellular Component

-

UniProtKB

P78347NULL (http://www.uniprot.org/uniprot/P78347NULL)

GenebankID or UniProtKB

()

Presumptive Null

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

Molecular Type

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

Aberration Type

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

Insertion Size

100-999 bp

Molecular Details of the Mutation

Cfa6.66 = insertion of a transposable element at the GTF2I locus. vonHolt et al 2017 show that the insertion is 259 bp and contains a 187-bp TE.

Experimental Evidence

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

Main Reference

Transposons in the Williams-Beuren Syndrome Critical Region are Associated with Social Behavior in Assistance Dogs. (2023) (https://pubmed.ncbi.nlm.nih.gov/38091228)

Authors

Gnanadesikan GE; Tandon D; Bray EE; Kennedy BS; Tennenbaum SR; MacLean EL; vonHoldt BM

Abstract

A strong signature of selection in the domestic dog genome is found in a five-megabase region of chromosome six in which four structural variants derived from transposons have previously been associated with human-oriented social behavior, such as attentional bias to social stimuli and social interest in strangers. To explore these genetic associations in more phenotypic detail-as well as their role in training success in a specialized assistance dog program-we genotyped 1001 assistance dogs from Canine Companions for IndependenceÂ®, including both successful graduates and dogs released from the training program for behaviors incompatible with their working role. We collected phenotypes on each dog using puppy-raiser questionnaires, trainer questionnaires, and both cognitive and behavioral tests. Using Bayesian mixed models, we found strong associations (95% credibility intervals excluding zero) between genotypes and certain behavioral measures, including separation-related problems, aggression when challenged or corrected, and reactivity to other dogs. Furthermore, we found moderate differences in the genotypes of dogs who graduated versus those who did not; insertions in GTF2I showed the strongest association with training success (Î²â€‰=â€‰0.23, CI = -Â 0.04, 0.49), translating to an odds-ratio of 1.25 for one insertion. Our results provide insight into the role of each of these four transposons in canine sociability and may inform breeding and training practices for working dog organizations. Furthermore, the observed importance of the gene GTF2I supports the emerging consensus that variation in GTF2I genotypes and expression have important consequences for social behavior broadly.

Additional References

Structural variants in genes associated with human Williams-Beuren syndrome underlie stereotypical hypersociability in domestic dogs. (2017) (https://pubmed.ncbi.nlm.nih.gov/28776031)

RELATED GEPHE

Related Genes

13 (Agouti (ASIP), GPR22, MFSD12, PMEL17, SLC45A2=MATP, FGF3; FGF4; FGF19; ORAOV1, Kit, MC1R, Melanophilin (MLPH), Microphtalmia-associated transcription factor, PSMB7, tyrosinase-related protein 1 (TYRP1), beta-defensin 103 (CBD103)) (https://www.gephebase.org/search-criteria?/or+Taxon ID=^9615^/and+Trait=Coloration/and+groupHaplotypes=true#gephebase-summary-title)

Related Haplotypes

No matches found.

EXTERNAL LINKS

COMMENTS

@TE