GEPHE SUMMARY

Gephebase Gene

BMP2 (https://www.gephebase.org/search-criteria?/and+Gene Gephebase=^BMP2^#gephebase-summary-title)

GepheID

GP00000151

Entry Status

Published

Main curator

Martin

PHENOTYPIC CHANGE

Trait #1

Trait Category

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

Trait

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

Trait State in Taxon A

Gallus gallus; wild and domesticated Red Jungle Fowl

Trait State in Taxon B

Gallus gallus; White Leghorn

Trait #2

Trait Category

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

Trait

Bird head morphology (male comb) (https://www.gephebase.org/search-criteria?/and+Trait=^Bird head morphology (male comb)^#gephebase-summary-title)

Trait State in Taxon A

-

Trait State in Taxon B

-

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

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

Common Name

chicken

Synonyms

Gallus gallus domesticus; chicken; bantam; chickens

Rank

species

Lineage

cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Deuterostomia; Chordata; Craniata; Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Sarcopterygii; Dipnotetrapodomorpha; Tetrapoda; Amniota; Sauropsida; Sauria; Archelosauria; Archosauria; Dinosauria; Saurischia; Theropoda; Coelurosauria; Aves; Neognathae; Galloanserae; Galliformes; Phasianidae; Phasianinae; Gallus

Parent

Gallus () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 9030)

NCBI Taxonomy ID

9031 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 9031)

is Taxon A an Infraspecies?

No

Taxon B

Latin Name

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

Common Name

chicken

Synonyms

Gallus gallus domesticus; chicken; bantam; chickens

Rank

species

Lineage

cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Deuterostomia; Chordata; Craniata; Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Sarcopterygii; Dipnotetrapodomorpha; Tetrapoda; Amniota; Sauropsida; Sauria; Archelosauria; Archosauria; Dinosauria; Saurischia; Theropoda; Coelurosauria; Aves; Neognathae; Galloanserae; Galliformes; Phasianidae; Phasianinae; Gallus

Parent

Gallus () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 9030)

NCBI Taxonomy ID

9031 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 9031)

is Taxon B an Infraspecies?

Yes

Taxon B Description

Gallus gallus; White Leghorn

GENOTYPIC CHANGE

Generic Gene Name

BMP2

Synonyms

BMP-2

String

9031.ENSGALP00000014334
(http://string-db.org/newstring_cgi/show_network_section.pl?identifier=
9031.ENSGALP00000014334)

UniProtKB Gallus gallus

Q90751 (http://www.uniprot.org/uniprot/Q90751)

GenebankID or UniProtKB

X75914 (https://www.ncbi.nlm.nih.gov/nuccore/X75914)

Sequence Similarities

Belongs to the TGF-beta family.

GO - Molecular Function

GO:0005125 : cytokine activity (https://www.ebi.ac.uk/QuickGO/term/GO:0005125)
GO:0008083 : growth factor activity (https://www.ebi.ac.uk/QuickGO/term/GO:0008083)
GO:0005160 : transforming growth factor beta receptor binding
(https://www.ebi.ac.uk/QuickGO/term/GO:0005160)
GO:0070700 : BMP receptor binding
(https://www.ebi.ac.uk/QuickGO/term/GO:0070700)

GO - Biological Process

GO:0000122 : negative regulation of transcription by RNA polymerase II
(https://www.ebi.ac.uk/QuickGO/term/GO:0000122)
GO:0010718 : positive regulation of epithelial to mesenchymal transition
(https://www.ebi.ac.uk/QuickGO/term/GO:0010718)
GO:0030509 : BMP signaling pathway
(https://www.ebi.ac.uk/QuickGO/term/GO:0030509)
GO:0048468 : cell development (https://www.ebi.ac.uk/QuickGO/term/GO:0048468)
GO:0010862 : positive regulation of pathway-restricted SMAD protein phosphorylation
(https://www.ebi.ac.uk/QuickGO/term/GO:0010862)
GO:0042981 : regulation of apoptotic process
(https://www.ebi.ac.uk/QuickGO/term/GO:0042981)
GO:0043408 : regulation of MAPK cascade
(https://www.ebi.ac.uk/QuickGO/term/GO:0043408)
GO:0060395 : SMAD protein signal transduction
(https://www.ebi.ac.uk/QuickGO/term/GO:0060395)
GO:0060317 : cardiac epithelial to mesenchymal transition
(https://www.ebi.ac.uk/QuickGO/term/GO:0060317)
GO:0051216 : cartilage development (https://www.ebi.ac.uk/QuickGO/term/GO:0051216)
GO:0001503 : ossification (https://www.ebi.ac.uk/QuickGO/term/GO:0001503)

GO - Cellular Component

GO:0005615 : extracellular space (https://www.ebi.ac.uk/QuickGO/term/GO:0005615)

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

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

Molecular Details of the Mutation

unknown; but intergenic QTL peak with decomposed effects on expression of BMP2 and HAO1

Experimental Evidence

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

Main Reference

A sexual ornament in chickens is affected by pleiotropic alleles at HAO1 and BMP2, selected during domestication. (2012) (https://pubmed.ncbi.nlm.nih.gov/22956912)

Authors

Johnsson M; Gustafson I; Rubin CJ; Sahlqvist AS; Jonsson KB; Kerje S; Ekwall O; KÃ¤mpe O; Andersson L; Jensen P; Wright D

Abstract

Domestication is one of the strongest forms of short-term, directional selection. Although selection is typically only exerted on one or a few target traits, domestication can lead to numerous changes in many seemingly unrelated phenotypes. It is unknown whether such correlated responses are due to pleiotropy or linkage between separate genetic architectures. Using three separate intercrosses between wild and domestic chickens, a locus affecting comb mass (a sexual ornament in the chicken) and several fitness traits (primarily medullary bone allocation and fecundity) was identified. This locus contains two tightly-linked genes, BMP2 and HAO1, which together produce the range of pleiotropic effects seen. This study demonstrates the importance of pleiotropy (or extremely close linkage) in domestication. The nature of this pleiotropy also provides insights into how this sexual ornament could be maintained in wild populations.

Additional References

The role of pleiotropy and linkage in genes affecting a sexual ornament and bone allocation in the chicken. (2014) (https://pubmed.ncbi.nlm.nih.gov/24655072)

RELATED GEPHE

Related Genes

2 (HAO1, MNR2) (https://www.gephebase.org/search-criteria?/or+Taxon ID=^9031^/and+Trait=Fertility/or+Taxon ID=^9031^/and+Trait=Bird head morphology/and+groupHaplotypes=true#gephebase-summary-title)

Related Haplotypes

No matches found.

EXTERNAL LINKS

COMMENTS

@Pleiotropy @SexualTrait