GEPHE SUMMARY

Gephebase Gene

VGLL3 (vestigial-like family member 3 gene) (https://www.gephebase.org/search-criteria?/and+Gene Gephebase=^VGLL3 (vestigial-like family member 3 gene)^#gephebase-summary-title)

Entry Status

Published

GepheID

GP00001167

Main curator

Martin

PHENOTYPIC CHANGE

Trait Category

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

Trait

Age of sexual maturity (https://www.gephebase.org/search-criteria?/and+Trait=^Age of sexual maturity^#gephebase-summary-title)

Trait State in Taxon A

Salmo salar

Trait State in Taxon B

Salmo salar

Ancestral State

Data not curated

Taxonomic Status

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

Taxon A

Latin Name

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

Common Name

Atlantic salmon

Synonyms

Atlantic salmon; Salmo salar Linnaeus, 1758

Rank

species

Lineage

cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Deuterostomia; Chordata; Craniata; Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupeocephala; Euteleosteomorpha; Protacanthopterygii; Salmoniformes; Salmonidae; Salmoninae; Salmo

Parent

Salmo () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 8028)

NCBI Taxonomy ID

8030 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 8030)

is Taxon A an Infraspecies?

No

Taxon B

Latin Name

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

Common Name

Atlantic salmon

Synonyms

Atlantic salmon; Salmo salar Linnaeus, 1758

Rank

species

Lineage

cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Deuterostomia; Chordata; Craniata; Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupeocephala; Euteleosteomorpha; Protacanthopterygii; Salmoniformes; Salmonidae; Salmoninae; Salmo

Parent

Salmo () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 8028)

NCBI Taxonomy ID

8030 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 8030)

is Taxon B an Infraspecies?

No

GENOTYPIC CHANGE

Generic Gene Name

VGLL3

Synonyms

VGL3; VGL-3

String

9606.ENSP00000381436 (http://string-db.org/newstring_cgi/show_network_section.pl?identifier=9606.ENSP00000381436)

Sequence Similarities

Belongs to the vestigial family.

GO - Molecular Function

-

GO - Biological Process

GO:0006357 : regulation of transcription by RNA polymerase II (https://www.ebi.ac.uk/QuickGO/term/GO:0006357)

GO - Cellular Component

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

UniProtKB Homo sapiens

A8MV65 (http://www.uniprot.org/uniprot/A8MV65)

GenebankID or UniProtKB

()

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

candidate amino-acid substitutions

Experimental Evidence

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

Main Reference

Sex-dependent dominance at a single locus maintains variation in age at maturity in salmon. (2015) (https://pubmed.ncbi.nlm.nih.gov/26536110)

Authors

Barson NJ; Aykanat T; Hindar K; Baranski M; Bolstad GH; Fiske P; Jacq C; Jensen AJ; Johnston SE; Karlsson S; Kent M; Moen T; NiemelÃ¤ E; Nome T; NÃ¦sje TF; Orell P; Romakkaniemi A; SÃ¦grov H; Urdal K; Erkinaro J; Lien S; Primmer CR

Abstract

Males and females share many traits that have a common genetic basis; however, selection on these traits often differs between the sexes, leading to sexual conflict. Under such sexual antagonism, theory predicts the evolution of genetic architectures that resolve this sexual conflict. Yet, despite intense theoretical and empirical interest, the specific loci underlying sexually antagonistic phenotypes have rarely been identified, limiting our understanding of how sexual conflict impacts genome evolution and the maintenance of genetic diversity. Here we identify a large effect locus controlling age at maturity in Atlantic salmon (Salmo salar), an important fitness trait in which selection favours earlier maturation in males than females, and show it is a clear example of sex-dependent dominance that reduces intralocus sexual conflict and maintains adaptive variation in wild populations. Using high-density single nucleotide polymorphism data across 57 wild populations and whole genome re-sequencing, we find that the vestigial-like family member 3 gene (VGLL3) exhibits sex-dependent dominance in salmon, promoting earlier and later maturation in males and females, respectively. VGLL3, an adiposity regulator associated with size and age at maturity in humans, explained 39% of phenotypic variation, an unexpectedly large proportion for what is usually considered a highly polygenic trait. Such large effects are predicted under balancing selection from either sexually antagonistic or spatially varying selection. Our results provide the first empirical example of dominance reversal allowing greater optimization of phenotypes within each sex, contributing to the resolution of sexual conflict in a major and widespread evolutionary trade-off between age and size at maturity. They also provide key empirical evidence for how variation in reproductive strategies can be maintained over large geographical scales. We anticipate these findings will have a substantial impact on population management in a range of harvested species where trends towards earlier maturation have been observed.

Additional References

The vgll3 Locus Controls Age at Maturity in Wild and Domesticated Atlantic Salmon (Salmo salar L.) Males. (2015) (https://pubmed.ncbi.nlm.nih.gov/26551894)

RELATED GEPHE

Related Genes

No matches found.

Related Haplotypes

No matches found.

EXTERNAL LINKS

COMMENTS

@BalancingSelection @SexualTrait ; dominance ; complex trait