GEPHE SUMMARY

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

GepheID
GP00002138

Entry Status
Published

Main curator
Martin

PHENOTYPIC CHANGE

Trait #1

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

Trait
Limb morphology (wing dimorphism) (https://www.gephebase.org/search-criteria?/and+Trait=^Limb morphology (wing dimorphism)^#gephebase-summary-title)

Trait State in Taxon A
winged males (aphicarus allele)

Trait State in Taxon B
wingless males

Trait #2

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

Trait
Flight behavior (wing dimorphism) (https://www.gephebase.org/search-criteria?/and+Trait=^Flight behavior (wing dimorphism)^#gephebase-summary-title)

Trait State in Taxon A
winged males (aphicarus allele); more active

Trait State in Taxon B
wingless males; less active

Ancestral State
Taxon A

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

Taxon A

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

Common Name
pea aphid

Synonyms
Acyrthosiphum pisum; pea aphid; Acyrthosiphon pisum (Harris, 1776); Acyrhosiphum pisum

Rank
species

Lineage
cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Protostomia; Ecdysozoa; Panarthropoda; Arthropoda; Mandibulata; Pancrustacea; Hexapoda; Insecta; Dicondylia; Pterygota; Neoptera; Paraneoptera; Hemiptera; Sternorrhyncha; Aphidomorpha; Aphidoidea; Aphididae; Aphidinae; Macrosiphini; Acyrthosiphon

Parent
Acyrthosiphon () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 7028)

NCBI Taxonomy ID
7029 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 7029)

is Taxon A an Infraspecies?
No

Taxon B

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

Common Name
pea aphid

Synonyms
Acyrthosiphum pisum; pea aphid; Acyrthosiphon pisum (Harris, 1776); Acyrhosiphum pisum

Rank
species

Lineage
cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Protostomia; Ecdysozoa; Panarthropoda; Arthropoda; Mandibulata; Pancrustacea; Hexapoda; Insecta; Dicondylia; Pterygota; Neoptera; Paraneoptera; Hemiptera; Sternorrhyncha; Aphidomorpha; Aphidoidea; Aphididae; Aphidinae; Macrosiphini; Acyrthosiphon

Parent
Acyrthosiphon () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 7028)

NCBI Taxonomy ID
7029 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 7029)

is Taxon B an Infraspecies?
No

GENOTYPIC CHANGE

Generic Gene Name

Fs

UniProtKB Drosophila melanogaster Q86NV3 (http://www.uniprot.org/uniprot/Q86NV3)

Synonyms

CG12955; CG12956; CG33466; dFol1; dfs; dFS; Dmel\CG33466; Fol1; fs; Dmel_CG33466

GenebankID or UniProtKB

()

String

7227.FBpp0089409 (http://string-db.org/newstring_cgi/show_network_section.pl?identifier= 7227.FBpp0089409)

Sequence Similarities

-

GO - Molecular Function

GO:0048185 : activin binding (https://www.ebi.ac.uk/QuickGO/term/GO:0048185)

GO - Biological Process

GO:0007275 : multicellular organism development (https://www.ebi.ac.uk/QuickGO/term/GO:0007275)
GO:0030154 : cell differentiation (https://www.ebi.ac.uk/QuickGO/term/GO:0030154)
GO:0030510 : regulation of BMP signaling pathway (https://www.ebi.ac.uk/QuickGO/term/GO:0030510)
GO:0030514 : negative regulation of BMP signaling pathway (https://www.ebi.ac.uk/QuickGO/term/GO:0030514)
GO:0032926 : negative regulation of activin receptor signaling pathway (https://www.ebi.ac.uk/QuickGO/term/GO:0032926)
GO:0032927 : positive regulation of activin receptor signaling pathway (https://www.ebi.ac.uk/QuickGO/term/GO:0032927)

GO - Cellular Component

GO:0005576 : extracellular region (https://www.ebi.ac.uk/QuickGO/term/GO:0005576)
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

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

Aberration Type

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

Insertion Size

-

Molecular Details of the Mutation

the api allele from winged males is a 120kb insertion that includes a copy of the follistatin gene

Experimental Evidence

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

Main Reference

A large genomic insertion containing a duplicated follistatin gene is linked to the pea aphid male wing dimorphism. (2020) (https://pubmed.ncbi.nlm.nih.gov/32141813)

Authors

Li B; Bickel RD; Parker BJ; Saleh Ziabari O; Liu F; Vellichirammal NN; Simon JC; Stern DL; Brisson JA

Abstract

Wing dimorphisms have long served as models for examining the ecological and evolutionary tradeoffs associated with alternative phenotypes. Here, we investigated the genetic cause of the pea aphid (Acyrthosiphon pisum) male wing dimorphism, wherein males exhibit one of two morphologies that differ in correlated traits that include the presence or absence of wings. We mapped this trait difference to a single genomic region and, using third generation, long-read sequencing, we identified a 120 kb insertion in the wingless allele. This insertion includes a duplicated follistatin gene, which is a strong candidate gene in the minimal mapped interval to cause the dimorphism. We found that both alleles were present prior to pea aphid biotype lineage diversification, we estimated that the insertion occurred millions of years ago, and we propose that both alleles have been maintained in the species, likely due to balancing selection.

Additional References

RELATED GEPHE

Related Genes

No matches found.

Related Haplotypes

No matches found.

EXTERNAL LINKS

COMMENTS

@GeneDuplication @BalancingSelection ; ancient polymorphism in the pea aphid lineage