GEPHE SUMMARY

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

GepheID
GP00002407

Entry Status
Published

Main curator
Courtier

PHENOTYPIC CHANGE

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

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

Trait State in Taxon A
Bombyx mori - local strains

Trait State in Taxon B
Bombyx mori - domesticated strains

Ancestral State
Taxon A

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

Taxon A

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

Common Name
domestic silkworm

Synonyms
domestic silkworm; silk moth; silkworm; Bombyx mori Linnaeus, 1758

Rank
species

Lineage
cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Protostomia; Ecdysozoa; Panarthropoda; Arthropoda; Mandibulata; Pancrustacea; Hexapoda; Insecta; Dicondylia; Pterygota; Neoptera; Holometabola; Amphiesmenoptera; Lepidoptera; Glossata; Neolepidoptera; Heteroneura; Ditrysia; Obtectomera; Bombycoidea; Bombycidae; Bombycinae; Bombyx

Parent
Bombyx () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 7090)

NCBI Taxonomy ID
7091 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 7091)

is Taxon A an Infraspecies?
No

Taxon B

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

Common Name
domestic silkworm

Synonyms
domestic silkworm; silk moth; silkworm; Bombyx mori Linnaeus, 1758

Rank
species

Lineage
cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Protostomia; Ecdysozoa; Panarthropoda; Arthropoda; Mandibulata; Pancrustacea; Hexapoda; Insecta; Dicondylia; Pterygota; Neoptera; Holometabola; Amphiesmenoptera; Lepidoptera; Glossata; Neolepidoptera; Heteroneura; Ditrysia; Obtectomera; Bombycoidea; Bombycidae; Bombycinae; Bombyx

Parent
Bombyx () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 7090)

NCBI Taxonomy ID
7091 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 7091)

is Taxon B an Infraspecies?
No

GENOTYPIC CHANGE

Generic Gene Name
GS

Synonyms
GS; Dmel\CG9674; CG9674; Dmel_CG9674

String
7227.FBpp0297083 (http://string-db.org/newstring_cgi/show_network_section.pl?identifier= 7227.FBpp0297083)

Sequence Similarities
Belongs to the glutamate synthase family.

GO - Molecular Function
GO:0016491 : oxidoreductase activity (https://www.ebi.ac.uk/QuickGO/term/GO:0016491)
GO:0005506 : iron ion binding (https://www.ebi.ac.uk/QuickGO/term/GO:0005506)
GO:0050660 : flavin adenine dinucleotide binding (https://www.ebi.ac.uk/QuickGO/term/GO:0050660)
GO:0010181 : FMN binding (https://www.ebi.ac.uk/QuickGO/term/GO:0010181)
GO:0051538 : 3 iron, 4 sulfur cluster binding

UniProtKB Drosophila melanogaster
M9NFH8 (http://www.uniprot.org/uniprot/M9NFH8)

GenebankID or UniProtKB
Q0KIX8 (https://www.ncbi.nlm.nih.gov/nuccore/Q0KIX8)

(https://www.ebi.ac.uk/QuickGO/term/GO:0051538)
GO:0016040 : glutamate synthase (NADH) activity
(https://www.ebi.ac.uk/QuickGO/term/GO:0016040)
GO:0015930 : glutamate synthase activity
(https://www.ebi.ac.uk/QuickGO/term/GO:0015930)

GO - Biological Process

GO:0006537 : glutamate biosynthetic process
(https://www.ebi.ac.uk/QuickGO/term/GO:0006537)
GO:0019676 : ammonia assimilation cycle
(https://www.ebi.ac.uk/QuickGO/term/GO:0019676)
GO:0097054 : L-glutamate biosynthetic process
(https://www.ebi.ac.uk/QuickGO/term/GO:0097054)

GO - Cellular Component

-

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

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

Molecular Details of the Mutation

Increased expression in the domesticated strains at the larval stage

Experimental Evidence

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

Main Reference

The evolutionary road from wild moth to domestic silkworm. (2018) (https://pubmed.ncbi.nlm.nih.gov/29967484)

Authors

Xiang H; Liu X; Li M; Zhu Y; Wang L; Cui Y; Liu L; Fang G; Qian H; Xu A; Wang W; Zhan S

Abstract

The Silk Road, which derives its name from the trade of silk produced by the domestic silkworm Bombyx mori, was an important episode in the development and interaction of human civilizations. However, the detailed history behind silkworm domestication remains ambiguous, and little is known about the underlying genetics with respect to important aspects of its domestication. Here, we reconstruct the domestication processes and identify selective sweeps by sequencing 137 representative silkworm strains. The results present an evolutionary scenario in which silkworms may have been initially domesticated in China as trimoulting lines, then subjected to independent spreads along the Silk Road that gave rise to the development of most local strains, and further improved for modern silk production in Japan and China, having descended from diverse ancestral sources. We find that genes with key roles in nitrogen and amino acid metabolism may have contributed to the promotion of silk production, and that circadian-related genes are generally selected for their adaptation. We additionally identify associations between several candidate genes and important breeding traits, thereby advancing the applicable value of our resources.

Additional References

High-resolution silkworm pan-genome provides genetic insights into artificial selection and ecological adaptation. (2022) (https://pubmed.ncbi.nlm.nih.gov/36153338)

RELATED GEPHE

Related Genes

6 (asparagine synthetase (AS), E2F1, Fkh, glutamate dehydrogenase (GDH), glutamine synthetase 2 (GS), sage) (https://www.gephebase.org/search-criteria?/or+Taxon ID=^7091^/and+Trait=Silk yield/and+groupHaplotypes=true#gephebase-summary-title)

Related Haplotypes

No matches found.

EXTERNAL LINKS

COMMENTS