GEPHE SUMMARY

Gephebase Gene
determinant of gall color (dgc) (https://www.gephebase.org/search-criteria?/and+Gene Gephebase=^determinant of gall color (dgc)^#gephebase-summary-title)

GepheID
GP00002392

Entry Status
Published

Main curator
Courtier

PHENOTYPIC CHANGE

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

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

Trait State in Taxon A
green gall

Trait State in Taxon B
red gall

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

Common Name
-

Synonyms
-

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; Hormaphididae; Hormaphidini; Hormaphis

Parent
Hormaphis () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 30176)

NCBI Taxonomy ID
30177 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 30177)

is Taxon A an Infraspecies?
No

Taxon B

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

Common Name
-

Synonyms
-

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; Hormaphididae; Hormaphidini; Hormaphis

Parent
Hormaphis () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 30176)

NCBI Taxonomy ID
30177 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 30177)

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
()

GenebankID or UniProtKB
()

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

almost complete silencing of dgc expression in salivary glands of aphids carrying the red gall allele

Experimental Evidence

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

Main Reference

A novel family of secreted insect proteins linked to plant gall development. (2021) (https://pubmed.ncbi.nlm.nih.gov/33657407)

Authors

Korgaonkar A; Han C; Lemire AL; Siwanowicz I; Bennouna D; Kopec RE; Andolfatto P; Shigenobu S; Stern DL

Abstract

In an elaborate form of inter-species exploitation, many insects hijack plant development to induce novel plant organs called galls that provide the insect with a source of nutrition and a temporary home. Galls result from dramatic reprogramming of plant cell biology driven by insect molecules, but the roles of specific insect molecules in gall development have not yet been determined. Here, we study the aphid Hormaphis cornu, which makes distinctive "cone" galls on leaves of witch hazel Hamamelis virginiana. We found that derived genetic variants in the aphid gene determinant of gall color (dgc) are associated with strong downregulation of dgc transcription in aphid salivary glands, upregulation in galls of seven genes involved in anthocyanin synthesis, and deposition of two red anthocyanins in galls. We hypothesize that aphids inject DGC protein into galls and that this results in differential expression of a small number of plant genes. dgc is a member of a large, diverse family of novel predicted secreted proteins characterized by a pair of widely spaced cysteine-tyrosine-cysteine (CYC) residues, which we named BICYCLE proteins. bicycle genes are most strongly expressed in the salivary glands specifically of galling aphid generations, suggesting that they may regulate many aspects of gall development. bicycle genes have experienced unusually frequent diversifying selection, consistent with their potential role controlling gall development in a molecular arms race between aphids and their host plants.

Additional References

RELATED GEPHE

Related Genes

No matches found.

Related Haplotypes

No matches found.

EXTERNAL LINKS

COMMENTS

dgc is a member of a large, diverse family of novel predicted secreted proteins characterized by a pair of widely spaced cysteine-tyrosine-cysteine (CYC) residues, named BICYCLE proteins.