GEPHE SUMMARY

Gephebase Gene
PTS/TKD1 (https://www.gephebase.org/search-criteria?/and+Gene Gephebase=^PTS/TKD1^#gephebase-summary-title)

GepheID
GP00000938

Entry Status
Published

Main curator
Martin

PHENOTYPIC CHANGE

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

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

Trait State in Taxon A
Solanum cheesmaniae

Trait State in Taxon B
Solanum galapagense

Ancestral State
Taxon A

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

Taxon A

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

Common Name
-

Synonyms
Lycopersicon cheesmaniae; Lycopersicon cheesmanii; non Solanum cheesmanii Geras.; Lycopersicon cheesmaniae L.Riley; Solanum cheesmaniae (L.Riley) Fosberg

Rank
species

Lineage
cellular organisms; Eukaryota; Viridiplantae; Streptophyta; Streptophytina; Embryophyta; Tracheophyta; Euphyllophyta; Spermatophyta; Magnoliophyta; Mesangiospermae; eudicotyledons; Gunneridae; Pentapetalae; asterids; lamiids; Solanales; Solanaceae; Solanoideae; Solaneae; Solanum; Lycopersicon

Parent
Lycopersicon () - (Rank: subgenus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 49274)

NCBI Taxonomy ID
142759 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 142759)

is Taxon A an Infraspecies?
No

Taxon B

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

Common Name
-

Synonyms
Lycopersicon cheesmaniae f. minor; Lycopersicon cheesmaniae f. minor (Hook.f.) C.H.Mull.; Solanum galapagense S.C.Darwin & Peralta; Solanum galapagaense

Rank
species

Lineage
cellular organisms; Eukaryota; Viridiplantae; Streptophyta; Streptophytina; Embryophyta; Tracheophyta; Euphyllophyta; Spermatophyta; Magnoliophyta; Mesangiospermae; eudicotyledons; Gunneridae; Pentapetalae; asterids; lamiids; Solanales; Solanaceae; Solanoideae; Solaneae; Solanum; Lycopersicon

Parent
Lycopersicon () - (Rank: subgenus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 49274)

NCBI Taxonomy ID
315350 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 315350)

is Taxon B an Infraspecies?
No

GENOTYPIC CHANGE

Generic Gene Name
PTS

Synonyms
KD1; TKD1; 100191115

String
4081.Solyc06g072480.1.1 (http://string-db.org/newstring_cgi/show_network_section.pl?identifier=4081.Solyc06g072480.1.1)

Sequence Similarities
-

GO - Molecular Function
GO:0003677 : DNA binding (https://www.ebi.ac.uk/QuickGO/term/GO:0003677)

GO - Biological Process
-

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

UniProtKB Solanum lycopersicum
B2Y2G9 (http://www.uniprot.org/uniprot/B2Y2G9)

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

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

Deletion Size

1-9 bp

Molecular Details of the Mutation

1bp deletion at -1232 from start Met

Experimental Evidence

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

Main Reference

Natural variation in leaf morphology results from mutation of a novel KNOX gene. (2008) (https://pubmed.ncbi.nlm.nih.gov/18424140)

Authors

Kimura S; Koenig D; Kang J; Yoong FY; Sinha N

Abstract

Striking diversity in size, arrangement, and complexity of leaves can sometimes be seen in closely related species. One such variation is found between wild tomato species collected by Charles Darwin from the Galapagos Islands [1-5]. Here, we show that a single-nucleotide deletion in the promoter of the PETROSELINUM (PTS) [3] gene upregulates the gene product in leaves and is responsible for the natural variation in leaf shape in the Galapagean tomatoes. PTS encodes a novel KNOTTED1-LIKE HOMEOBOX (KNOX) gene that lacks a homeodomain. We also showed that the tomato classical mutant bipinnata (bip) [6], which recapitulates the Pts phenotype, results from the loss of function of a BEL-LIKE HOMEODOMAIN (BELL) gene, BIP. We used bimolecular fluorescence complementation and two-hybrid competition assays to show that PTS represses KNOX1 protein interactions with BIP, as well as subsequent nuclear localization of this transcriptional complex. We suggest that natural variation in leaf shape can be created with a rheostat-like mechanism that alters the KNOX1 protein interaction network specifically during leaf development. This subtle change in interaction between transcription factors leaves essential KNOX1 function in the shoot apical meristem intact and appears to be a facile way to alter leaf morphology during evolution.

Additional References

RELATED GEPHE

Related Genes

No matches found.

Related Haplotypes

No matches found.

EXTERNAL LINKS

COMMENTS