GEPHE SUMMARY

Gephebase Gene
BRANCHED1a (BRC1a) (https://www.gephebase.org/search-criteria?/and+Gene Gephebase=^BRANCHED1a (BRC1a)^#gephebase-summary-title)

GepheID
GP00000156

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

Trait State in Taxon A
Plant and Flower architecture of Capsicum and Petunia

Trait State in Taxon B
Plant and Flower architecture of Solanum spp.

Trait #2

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

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

Trait State in Taxon A
Plant and Flower architecture of Capsicum and Petunia

Trait State in Taxon B
Plant and Flower architecture of Solanum spp.

Ancestral State
Taxon A

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

Taxon A

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

Common Name
-

Synonyms
Capsicum annuum L.; Capsicum annum; Capsicum capsicum

Rank
species

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

Parent
Capsicum (peppers) - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 4071)

NCBI Taxonomy ID
4072 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 4072)

is Taxon A an Infraspecies?
No

Taxon B

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

Common Name
-

Synonyms
Cyphomandra Mart. ex Sendtn.; Solanum L.

Rank
genus

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

Parent
Solaneae () - (Rank: tribe) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 424574)

NCBI Taxonomy ID
4107 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 4107)

is Taxon B an Infraspecies?
No

GENOTYPIC CHANGE

Generic Gene Name

BRC1A

UniProtKB Solanum tuberosum

F6KB94 (http://www.uniprot.org/uniprot/F6KB94)

Synonyms

TCP18; 102578271

GenebankID or UniProtKB

()

String

-

Sequence Similarities

-

GO - Molecular Function

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

GO - Biological Process

GO:0006355 : regulation of transcription, DNA-templated (https://www.ebi.ac.uk/QuickGO/term/GO:0006355)
GO:0006351 : transcription, DNA-templated (https://www.ebi.ac.uk/QuickGO/term/GO:0006351)

GO - Cellular Component

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

Presumptive Null

No (https://www.gephebase.org/search-criteria?/and+Presumptive Null=^No^#gephebase-summary-title)

Molecular Type

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

Aberration Type

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

SNP Coding Change

-

Molecular Details of the Mutation

Evolution of an alternative splice site (G>A) that unlocks a short isoform

Experimental Evidence

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

	Taxon A	Taxon B	Position
Codon	-	-	-
Amino-acid	-	-	-

Main Reference

A Recently Evolved Alternative Splice Site in the BRANCHED1a Gene Controls Potato Plant Architecture. (2015) (https://pubmed.ncbi.nlm.nih.gov/26119747)

Authors

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Abstract

Amplification and diversification of transcriptional regulators that control development is a driving force of morphological evolution. A major source ofÂ protein diversity is alternative splicing, which leads to the generation of different isoforms from a single gene. The mechanisms and timing of intron evolution nonetheless remain unclear, and the functions of alternative splicing-generated protein isoforms are rarely studied. In Solanum tuberosum, the BRANCHED1a (BRC1a) gene encodes a TCP transcription factor that controls lateral shoot outgrowth. Here, we report the recent evolution in Solanum of an alternative splice site in BRC1a that leads to the generation of two BRC1a protein isoforms with distinct C-terminal regions, BRC1a(Long) and BRC1a(Short), encoded by unspliced and spliced mRNA, respectively. The BRC1a(Long) C-terminal region has a strong activation domain, whereas that of BRC1a(S) lacks an activation domain and is predicted to form an amphipathic helix, the H domain, which prevents protein nuclear targeting. BRC1a(Short) is thus mainly cytoplasmic, while BRC1a(Long) is mainly nuclear. BRC1a(Long) functions as a transcriptional activator, whereas BRC1a(Short) appears to have no transcriptional activity. Moreover, BRC1a(Short) can heterodimerize with BRC1a(Long) and act as a dominant-negative factor; it increases BRC1a(Long) concentration in cytoplasm and reduces its transcriptional activity. This alternative splicing mechanism is regulated by hormones and external stimuli that control branching. The evolution of a new alternative splicing site and a novel protein domain in Solanum BRC1a led to a multi-level mechanism of post-transcriptional and post-translational BRC1a regulation that effectively modulates its branch suppressing activity in response to environmental and endogenous cues.

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Additional References

RELATED GEPHE

Related Genes

No matches found.

Related Haplotypes

No matches found.

EXTERNAL LINKS

COMMENTS

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