GEPHE SUMMARY

Gephebase Gene
CYC-like HaCYC2c (https://www.gephebase.org/search-criteria?/and+Gene Gephebase=^CYC-like HaCYC2c^#gephebase-summary-title)

GepheID
GP00000193

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

Trait State in Taxon A
Helianthus annuus

Trait State in Taxon B
Helianthus annuus -double-flowered phenotype

Ancestral State
Taxon A

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

Taxon A

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

Common Name
common sunflower

Synonyms
common sunflower; Helianthus annuus L.; Helianthus annua; Helianthus annus; Helianthus annuus8

Rank
species

Lineage
cellular organisms; Eukaryota; Viridiplantae; Streptophyta; Streptophytina; Embryophyta; Tracheophyta; Euphyllophyta; Spermatophyta; Magnoliophyta; Mesangiospermae; eudicotyledons; Gunneridae; Pentapetalae; asterids; campanulids; Asterales; Asteraceae; Asteroideae; Heliantheae alliance; Heliantheae; Helianthus

Parent
Helianthus () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 4231)

NCBI Taxonomy ID
4232 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 4232)

is Taxon A an Infraspecies?
No

Taxon B

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

Common Name
common sunflower

Synonyms
common sunflower; Helianthus annuus L.; Helianthus annua; Helianthus annus; Helianthus annuus8

Rank
species

Lineage
cellular organisms; Eukaryota; Viridiplantae; Streptophyta; Streptophytina; Embryophyta; Tracheophyta; Euphyllophyta; Spermatophyta; Magnoliophyta; Mesangiospermae; eudicotyledons; Gunneridae; Pentapetalae; asterids; campanulids; Asterales; Asteraceae; Asteroideae; Heliantheae alliance; Heliantheae; Helianthus

Parent
Helianthus () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 4231)

NCBI Taxonomy ID
4232 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 4232)

is Taxon B an Infraspecies?
No

GENOTYPIC CHANGE

Generic Gene Name
CYC

Synonyms
-

String
-

Sequence Similarities
-

GO - Molecular Function
GO:0003700 : DNA-binding transcription factor activity (https://www.ebi.ac.uk/QuickGO/term/GO:0003700)
GO:0003677 : DNA binding (https://www.ebi.ac.uk/QuickGO/term/GO:0003677)

GO - Biological Process
GO:0009908 : flower development (https://www.ebi.ac.uk/QuickGO/term/GO:0009908)
GO:0048262 : determination of dorsal/ventral asymmetry (https://www.ebi.ac.uk/QuickGO/term/GO:0048262)
GO:0009799 : specification of symmetry

UniProtKB Antirrhinum majus
O49250 (http://www.uniprot.org/uniprot/O49250)

GenebankID or UniProtKB
()

(https://www.ebi.ac.uk/QuickGO/term/GO:0009799)

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

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

Aberration Type

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

Insertion Size

100-999 bp

Molecular Details of the Mutation

999bp insertion in promoter

Experimental Evidence

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

Main Reference

Genetic analysis of floral symmetry in Van Gogh's sunflowers reveals independent recruitment of CYCLOIDEA genes in the Asteraceae. (2012) (https://pubmed.ncbi.nlm.nih.gov/22479210)

Authors

Chapman MA; Tang S; Draeger D; Nambeesan S; Shaffer H; Barb JG; Knapp SJ; Burke JM

Abstract

The genetic basis of floral symmetry is a topic of great interest because of its effect on pollinator behavior and, consequently, plant diversification. The Asteraceae, which is the largest family of flowering plants, is an ideal system in which to study this trait, as many species within the family exhibit a compound inflorescence containing both bilaterally symmetric (i.e., zygomorphic) and radially symmetric (i.e., actinomorphic) florets. In sunflower and related species, the inflorescence is composed of a single whorl of ray florets surrounding multiple whorls of disc florets. We show that in double-flowered (dbl) sunflower mutants (in which disc florets develop bilateral symmetry), such as those captured by Vincent van Gogh in his famous nineteenth-century sunflower paintings, an insertion into the promoter region of a CYCLOIDEA (CYC)-like gene (HaCYC2c) that is normally expressed specifically in WT rays is instead expressed throughout the inflorescence, presumably resulting in the observed loss of actinomorphy. This same gene is mutated in two independent tubular-rayed (tub) mutants, though these mutations involve apparently recent transposon insertions, resulting in little or no expression and radialization of the normally zygomorphic ray florets. Interestingly, a phylogenetic analysis of CYC-like genes from across the family suggests that different paralogs of this fascinating gene family have been independently recruited to specify zygomorphy in different species within the Asteraceae.

Additional References

RELATED GEPHE

Related Genes

No matches found.

Related Haplotypes

No matches found.

EXTERNAL LINKS

COMMENTS

@TE