

GEPHE SUMMARY

phytochrome B (PHYB) (https://www.gephebase.org/search-criteria?/and+Gene)		Gephebase Gene		GepheID
Gephebase=^phytochrome B (PHYB)^#gephebase-summary-title)			GP00000871	
		Entry Status	Martin	Main curator
Published				

PHENOTYPIC CHANGE

Physiology (https://www.gephebase.org/search-criteria?/and+Trait)		Trait Category	
Category=^Physiology^#gephebase-summary-title)		Trait	
Light sensitivity (https://www.gephebase.org/search-criteria?/and+Trait=^Light)		Trait State in Taxon A	
sensitivity^#gephebase-summary-title)		Trait State in Taxon B	
Arabidopsis thaliana- Ler0		Ancestral State	
Arabidopsis thaliana - Cvi		Taxonomic Status	
Data not curated		Intraspecific (https://www.gephebase.org/search-criteria?/and+Taxonomic)	
Status=^Intraspecific^#gephebase-summary-title)			
Taxon A		Taxon B	
Arabidopsis thaliana		Arabidopsis thaliana	
(https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=^Arabidopsis		(https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=^Arabidopsis	
thaliana^#gephebase-summary-title)		thaliana^#gephebase-summary-title)	
thale cress		thale cress	
thale cress; mouse-ear cress; thale-cress; Arabidopsis thaliana (L.) Heynh.; Arabidopsis		thale cress; mouse-ear cress; thale-cress; Arabidopsis thaliana (L.) Heynh.; Arabidopsis	
thaliana (thale cress); Arabidopsis_thaliana; Arbisopsis thaliana; thale kress		thaliana (thale cress); Arabidopsis_thaliana; Arbisopsis thaliana; thale kress	
species		species	
cellular organisms; Eukaryota; Viridiplantae; Streptophyta; Streptophytina; Embryophyta;		cellular organisms; Eukaryota; Viridiplantae; Streptophyta; Streptophytina; Embryophyta;	
Tracheophyta; Euphyllophyta; Spermatophyta; Magnoliophyta; Mesangiospermae;		Tracheophyta; Euphyllophyta; Spermatophyta; Magnoliophyta; Mesangiospermae;	
eudicotyledons; Gunneridae; Pentapetales; rosids; malvids; Brassicales; Brassicaceae;		eudicotyledons; Gunneridae; Pentapetales; rosids; malvids; Brassicales; Brassicaceae;	
Camelineae; Arabidopsis		Camelineae; Arabidopsis	
Arabidopsis () - (Rank: genus)		Arabidopsis () - (Rank: genus)	
(https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 3701)		(https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 3701)	
3702		3702	
(https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 3702)		(https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 3702)	
is Taxon A an Intraspecies?		is Taxon B an Intraspecies?	
Yes		Yes	
Arabidopsis thaliana- Ler0		Arabidopsis thaliana - Cvi	

GENOTYPIC CHANGE

PHYB		Generic Gene Name	UniProtKB Arabidopsis thaliana
HY3; MSF3.17; MSF3_17; OOP1; OUT OF PHASE 1; phytochrome B; PHYTOCHROME		Synonyms	GenebankID or UniProtKB
B; At2g18790		String	CP002685 (https://www.ncbi.nlm.nih.gov/nuccore/CP002685)
3702.AT2G18790.1		Sequence Similarities	
(http://string-db.org/newstring.cgi/show_network_section.pl?identifier= 3702.AT2G18790.1		GO - Molecular Function	
)			
Belongs to the phytochrome family.			
GO:0042802 : identical protein binding			
(https://www.ebi.ac.uk/QuickGO/term/GO:0042802)			
GO:0042803 : protein homodimerization activity			

(<https://www.ebi.ac.uk/QuickGO/term/GO:0042803>)
GO:0043565 : sequence-specific DNA binding
(<https://www.ebi.ac.uk/QuickGO/term/GO:0043565>)
GO:0000155 : phosphorelay sensor kinase activity
(<https://www.ebi.ac.uk/QuickGO/term/GO:0000155>)
GO:0031516 : far-red light photoreceptor activity
(<https://www.ebi.ac.uk/QuickGO/term/GO:0031516>)
GO:0009883 : red or far-red light photoreceptor activity
(<https://www.ebi.ac.uk/QuickGO/term/GO:0009883>)
GO:1990841 : promoter-specific chromatin binding
(<https://www.ebi.ac.uk/QuickGO/term/GO:1990841>)
GO:0031517 : red light photoreceptor activity
(<https://www.ebi.ac.uk/QuickGO/term/GO:0031517>)

GO - Biological Process

GO:0009640 : photomorphogenesis
(<https://www.ebi.ac.uk/QuickGO/term/GO:0009640>)
GO:0045892 : negative regulation of transcription, DNA-templated
(<https://www.ebi.ac.uk/QuickGO/term/GO:0045892>)
GO:0009409 : response to cold (<https://www.ebi.ac.uk/QuickGO/term/GO:0009409>)
GO:0006325 : chromatin organization
(<https://www.ebi.ac.uk/QuickGO/term/GO:0006325>)
GO:0010617 : circadian regulation of calcium ion oscillation
(<https://www.ebi.ac.uk/QuickGO/term/GO:0010617>)
GO:0009638 : phototropism (<https://www.ebi.ac.uk/QuickGO/term/GO:0009638>)
GO:0018298 : protein-chromophore linkage
(<https://www.ebi.ac.uk/QuickGO/term/GO:0018298>)
GO:2000028 : regulation of photoperiodism, flowering
(<https://www.ebi.ac.uk/QuickGO/term/GO:2000028>)
GO:0010244 : response to low fluence blue light stimulus by blue low-fluence system
(<https://www.ebi.ac.uk/QuickGO/term/GO:0010244>)
GO:0009867 : jasmonic acid mediated signaling pathway
(<https://www.ebi.ac.uk/QuickGO/term/GO:0009867>)
GO:0010148 : transpiration (<https://www.ebi.ac.uk/QuickGO/term/GO:0010148>)
GO:0009266 : response to temperature stimulus
(<https://www.ebi.ac.uk/QuickGO/term/GO:0009266>)
GO:0010218 : response to far red light
(<https://www.ebi.ac.uk/QuickGO/term/GO:0010218>)
GO:0009649 : entrainment of circadian clock
(<https://www.ebi.ac.uk/QuickGO/term/GO:0009649>)
GO:0009584 : detection of visible light
(<https://www.ebi.ac.uk/QuickGO/term/GO:0009584>)
GO:0009630 : gravitropism (<https://www.ebi.ac.uk/QuickGO/term/GO:0009630>)
GO:0010161 : red light signaling pathway
(<https://www.ebi.ac.uk/QuickGO/term/GO:0010161>)
GO:0009687 : abscisic acid metabolic process
(<https://www.ebi.ac.uk/QuickGO/term/GO:0009687>)
GO:0015979 : photosynthesis (<https://www.ebi.ac.uk/QuickGO/term/GO:0015979>)
GO:0017012 : protein-phytochromobilin linkage
(<https://www.ebi.ac.uk/QuickGO/term/GO:0017012>)
GO:0031347 : regulation of defense response
(<https://www.ebi.ac.uk/QuickGO/term/GO:0031347>)
GO:0010029 : regulation of seed germination
(<https://www.ebi.ac.uk/QuickGO/term/GO:0010029>)
GO:0010202 : response to low fluence red light stimulus
(<https://www.ebi.ac.uk/QuickGO/term/GO:0010202>)
GO:0010374 : stomatal complex development
(<https://www.ebi.ac.uk/QuickGO/term/GO:0010374>)

GO - Cellular Component

GO:0005829 : cytosol (<https://www.ebi.ac.uk/QuickGO/term/GO:0005829>)
GO:0005634 : nucleus (<https://www.ebi.ac.uk/QuickGO/term/GO:0005634>)
GO:0016604 : nuclear body (<https://www.ebi.ac.uk/QuickGO/term/GO:0016604>)
GO:0016607 : nuclear speck (<https://www.ebi.ac.uk/QuickGO/term/GO:0016607>)

	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
Nonsynonymous	
	Molecular Details of the Mutation
I143L	
	Experimental Evidence
Linkage Mapping (https://www.gephebase.org/search-criteria?/and+Experimental Evidence=~Linkage Mapping~#gephebase-summary-title)	

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

Main Reference

Amino acid polymorphisms in Arabidopsis phytochrome B cause differential responses to light. (2008) (<https://pubmed.ncbi.nlm.nih.gov/18287016>)

Authors

Filialt DL; Wessinger CA; Dinnyen JR; Lutes J; Borevitz JO; Weigel D; Chory J; Maloof JN

Abstract

Plants have a sophisticated system for sensing and responding to their light environment. The light responses of populations and species native to different habitats show adaptive variation; understanding the mechanisms underlying photomorphogenic variation is therefore of significant interest. In *Arabidopsis thaliana*, phytochrome B (PHYB) is the dominant photoreceptor for red light and plays a major role in white light. Because PHYB has been proposed as a candidate gene for several quantitative trait loci (QTLs) affecting light response, we have investigated sequence and functional variation in *Arabidopsis* PHYB. We examined PHYB sequences in 33 *A. thaliana* individuals and in the close relative *Arabidopsis lyrata*. From 14 nonsynonymous polymorphisms, we chose 5 for further study based on previous QTL studies. In a larger collection of *A. thaliana* accessions, one of these five polymorphisms, I143L, was associated with variation in red light response. We used transgenic analysis to test this association and confirmed experimentally that natural PHYB polymorphisms cause differential plant responses to light. Furthermore, our results show that allelic variation of PHYB activity is due to amino acid rather than regulatory changes. Together with earlier studies linking variation in light sensitivity to photoreceptor genes, our work suggests that photoreceptors may be a common target of natural selection.

Additional References

RELATED GEPHE

Related Genes

2 (phytochrome A (PHYA), phytochrome C (PHYC)) (<https://www.gephebase.org/search-criteria?/or+Taxon ID=^3702^/and+Trait=Light sensitivity/and+groupHaplotypes=true#gephebase-summary-title>)

Related Haplotypes

No matches found.

EXTERNAL LINKS

COMMENTS

@GxE