

GEPHE SUMMARY

	Gephebase Gene		GepheID
phytochrome A (PHYA) (https://www.gephebase.org/search-criteria?/and+Gene)		GP00000870	
Gephebase="phytochrome A (PHYA)"#gephebase-summary-title)			Main curator
Published	Entry Status	Martin	

PHENOTYPIC CHANGE

	Trait Category		
Physiology (https://www.gephebase.org/search-criteria?/and+Trait)			
Category="Physiology"#gephebase-summary-title)	Trait		
Light sensitivity (https://www.gephebase.org/search-criteria?/and+Trait="Light)			
sensitivity"#gephebase-summary-title)	Trait State in Taxon A		
Arabidopsis thaliana	Trait State in Taxon B		
Arabidopsis thaliana Lm-2	Ancestral State		
Data not curated	Taxonomic Status		
Intraspecific (https://www.gephebase.org/search-criteria?/and+Taxonomic)			
Status="Intraspecific"#gephebase-summary-title)			
	Taxon A		Taxon B
	Latin Name		Latin Name
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)	Common Name	thaliana"#gephebase-summary-title)	Common Name
thale cress		thale cress	
	Synonyms		Synonyms
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	Rank	thaliana (thale cress); Arabidopsis_thaliana; Arbisopsis thaliana; thale kress	Rank
species		species	
	Lineage		Lineage
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	Parent	Camelineae; Arabidopsis	Parent
Arabidopsis () - (Rank: genus)		Arabidopsis () - (Rank: genus)	
(https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=3701)	NCBI Taxonomy ID	(https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=3701)	NCBI Taxonomy ID
3702		3702	
(https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=3702)	is Taxon A an Intraspecies?	(https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=3702)	is Taxon B an Intraspecies?
No		Yes	
			Taxon B Description
		Arabidopsis thaliana Lm-2	

GENOTYPIC CHANGE

	Generic Gene Name		UniProtKB Arabidopsis thaliana
PHYA		P14712 (http://www.uniprot.org/uniprot/P14712)	
	Synonyms		GenebankID or UniProtKB
ELONGATED HYPOCOTYL 8; F14J9.23; F14J9_23; FAR RED ELONGATED 1; FAR		L21154 (https://www.ncbi.nlm.nih.gov/nuccore/L21154)	
RED ELONGATED HYPOCOTYL 2; FHY2; FRE1; HY8; phytochrome A; At1g09570	String		
3702.AT1G09570.1			
(http://string-db.org/newstring.cgi/show_network_section.pl?identifier=3702.AT1G09570.1)	Sequence Similarities		
Belongs to the phytochrome family.	GO - Molecular Function		
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:0003729 : mRNA binding (<https://www.ebi.ac.uk/QuickGO/term/GO:0003729>)
GO:0004672 : protein kinase activity (<https://www.ebi.ac.uk/QuickGO/term/GO:0004672>)
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 - Biological Process

GO:0009640 : photomorphogenesis
(<https://www.ebi.ac.uk/QuickGO/term/GO:0009640>)
GO:0006355 : regulation of transcription, DNA-templated
(<https://www.ebi.ac.uk/QuickGO/term/GO:0006355>)
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:0017148 : negative regulation of translation
(<https://www.ebi.ac.uk/QuickGO/term/GO:0017148>)
GO:0010218 : response to far red light
(<https://www.ebi.ac.uk/QuickGO/term/GO:0010218>)
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:0017006 : protein-tetrapyrrole linkage
(<https://www.ebi.ac.uk/QuickGO/term/GO:0017006>)
GO:0010161 : red light signaling pathway
(<https://www.ebi.ac.uk/QuickGO/term/GO:0010161>)
GO:0046685 : response to arsenic-containing substance
(<https://www.ebi.ac.uk/QuickGO/term/GO:0046685>)
GO:0010201 : response to continuous far red light stimulus by the high-irradiance response system (<https://www.ebi.ac.uk/QuickGO/term/GO:0010201>)
GO:0010203 : response to very low fluence red light stimulus
(<https://www.ebi.ac.uk/QuickGO/term/GO:0010203>)

GO - Cellular Component

GO:0005737 : cytoplasm (<https://www.ebi.ac.uk/QuickGO/term/GO:0005737>)
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>)

No (https://www.gephebase.org/search-criteria?/and+Presumptive Null=~No~#gephebase-summary-title)	Presumptive Null
Coding (https://www.gephebase.org/search-criteria?/and+Molecular Type=~Coding~#gephebase-summary-title)	Molecular Type
SNP (https://www.gephebase.org/search-criteria?/and+Aberration Type=~SNP~#gephebase-summary-title)	Aberration Type
Nonsynonymous	SNP Coding Change
M548T	Molecular Details of the Mutation
Candidate Gene (https://www.gephebase.org/search-criteria?/and+Experimental Evidence=~Candidate Gene~#gephebase-summary-title)	Experimental Evidence

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

Natural variation in light sensitivity of Arabidopsis. (2001) (https://pubmed.ncbi.nlm.nih.gov/11726931)	Main Reference
Maloof JN; Borevitz JO; Dabi T; Lutes J; Nehring RB; Redfern JL; Trainer GT; Wilson JM; Asami T; Berry CC; Weigel D; Chory J	Authors
	Abstract

Because plants depend on light for growth, their development and physiology must suit the particular light environment. Plants native to different environments show heritable, apparently adaptive, changes in their response to light. As a first step in unraveling the genetic and molecular basis of these naturally occurring differences, we have characterized intraspecific variation in a light-dependent developmental process-seedling emergence. We examined 141 Arabidopsis thaliana accessions for their response to four light conditions, two hormone conditions and darkness. There was significant variation in all conditions, confirming that Arabidopsis is a rich source of natural genetic diversity. Hierarchical clustering revealed that some accessions had response patterns similar to known photoreceptor mutants, suggesting changes in specific signaling pathways. We found that the unusual far-red response of the Lm-2 accession is due to a single amino-acid change in the phytochrome A (PHYA) protein. This change stabilizes the light-labile PHYA protein in light and causes a 100-fold shift in the threshold for far-red light sensitivity. Purified recombinant Lm-2 PHYA also shows subtle photochemical differences and has a reduced capacity for autophosphorylation. These biochemical changes contrast with previously characterized natural alleles in loci controlling plant development, which result in altered gene expression or loss of gene function.

Additional References

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

No matches found.

EXTERNAL LINKS

COMMENTS

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