

# GEPHE SUMMARY

	Gephebase Gene	GephelD
phytochrome D (PHYD) ( <a href="https://www.gephebase.org/search-criteria?/and+Gene">https://www.gephebase.org/search-criteria?/and+Gene</a> Gephebase="phytochrome D (PHYD)"#gephebase-summary-title)	GP00000874	
	Entry Status	Main curator
Published	Martin	

## PHENOTYPIC CHANGE

Trait #1	Trait Category	Trait
Morphology ( <a href="https://www.gephebase.org/search-criteria?/and+Trait">https://www.gephebase.org/search-criteria?/and+Trait</a> Category="Morphology" #gephebase-summary-title)		
Leaf morphology (increased petiole length) ( <a href="https://www.gephebase.org/search-criteria?/and+Trait=^Leaf morphology (increased petiole length)^#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Trait=^Leaf morphology (increased petiole length)^#gephebase-summary-title</a> )		
Arabidopsis thaliana	Trait State in Taxon A	
Arabidopsis thaliana Ws	Trait State in Taxon B	

Trait #2	Trait Category	Trait
Morphology ( <a href="https://www.gephebase.org/search-criteria?/and+Trait">https://www.gephebase.org/search-criteria?/and+Trait</a> Category="Morphology" #gephebase-summary-title)		
Cotyledon morphology (reduced cotyledon area) ( <a href="https://www.gephebase.org/search-criteria?/and+Trait=^Cotyledon morphology (reduced cotyledon area)^#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Trait=^Cotyledon morphology (reduced cotyledon area)^#gephebase-summary-title</a> )		
-	Trait State in Taxon A	
-	Trait State in Taxon B	
-		

Trait #3	Trait Category	Trait
Morphology ( <a href="https://www.gephebase.org/search-criteria?/and+Trait">https://www.gephebase.org/search-criteria?/and+Trait</a> Category="Morphology" #gephebase-summary-title)		
Coloration (anthocyanin accumulation in seedling stems) ( <a href="https://www.gephebase.org/search-criteria?/and+Trait=^Coloration (anthocyanin accumulation in seedling stems)^#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Trait=^Coloration (anthocyanin accumulation in seedling stems)^#gephebase-summary-title</a> )		
-	Trait State in Taxon A	
-	Trait State in Taxon B	
-		

Trait #4	Trait Category	Trait
Physiology ( <a href="https://www.gephebase.org/search-criteria?/and+Trait">https://www.gephebase.org/search-criteria?/and+Trait</a> Category="Physiology" #gephebase-summary-title)		
Plant size (diminished effect of end-of-day pulse of far red light on hypocotyl elongation) ( <a href="https://www.gephebase.org/search-criteria?/and+Trait=^Plant size (diminished effect of end-of-day pulse of far red light on hypocotyl elongation)^#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Trait=^Plant size (diminished effect of end-of-day pulse of far red light on hypocotyl elongation)^#gephebase-summary-title</a> )		
-	Trait State in Taxon A	
-	Trait State in Taxon B	
-		

Trait #5	Trait Category	Trait

Morphology (<https://www.gephbase.org/search-criteria/?and+Trait>  
Category="Morphology">#gephbase-summary-title)

Trait  
Plant architecture (decrease in number of rosette leaves at onset of flowering)  
([#gephbase-summary-title](https://www.gephbase.org/search-criteria/?and+Trait=^Plant+architecture+(decrease+in+number+of+rosette+leaves+at+onset+of+flowering)))  
Trait State in Taxon A  
-  
-  
Trait State in Taxon B  
-

Ancestral State

Taxon A

Taxonomic Status

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

Taxon A

Latin Name

Arabidopsis thaliana  
([#gephbase-summary-title](https://www.gephbase.org/search-criteria/?and+Taxon+and+Synonyms=^Arabidopsis+thaliana))

Common Name

thale cress

Synonyms

thale cress; mouse-ear cress; thale-cress; Arabidopsis thaliana (L.) Heynh.; Arabidopsis thaliana (thale cress); Arabidopsis\_thaliana; Arbisopsis thaliana; thale kress

Rank

species

Lineage

cellular organisms; Eukaryota; Viriplantae; Streptophyta; Streptophytina; Embryophyta; Tracheophyta; Euphyllphyta; Spermatophyta; Magnoliophyta; Mesangiospermae; eudicotyledons; Gunneridae; Pentapetalae; rosids; malvids; Brassicales; Brassicaceae; Camelinae; Arabidopsis

Parent

Arabidopsis () - (Rank: genus)

(<https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=3701>)

NCBI Taxonomy ID

3702

(<https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=3702>)

is Taxon A an Infraspecies?

No

Taxon B

Latin Name

Arabidopsis thaliana  
([#gephbase-summary-title](https://www.gephbase.org/search-criteria/?and+Taxon+and+Synonyms=^Arabidopsis+thaliana))

Common Name

thale cress

Synonyms

thale cress; mouse-ear cress; thale-cress; Arabidopsis thaliana (L.) Heynh.; Arabidopsis thaliana (thale cress); Arabidopsis\_thaliana; Arbisopsis thaliana; thale kress

Rank

species

Lineage

cellular organisms; Eukaryota; Viriplantae; Streptophyta; Streptophytina; Embryophyta; Tracheophyta; Euphyllphyta; Spermatophyta; Magnoliophyta; Mesangiospermae; eudicotyledons; Gunneridae; Pentapetalae; rosids; malvids; Brassicales; Brassicaceae; Camelinae; Arabidopsis

Parent

Arabidopsis () - (Rank: genus)

(<https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=3701>)

NCBI Taxonomy ID

3702

(<https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=3702>)

is Taxon B an Infraspecies?

Yes

Taxon B Description

Arabidopsis thaliana Ws

## GENOTYPIC CHANGE

PHYD

Generic Gene Name

DL4165C; FCAALL\_323; phytochrome D; PHYTOCHROME D; At4g16250; dl4165c  
3702.AT4G16250.1  
([http://string-db.org/newstring\\_cgi/show\\_network\\_section.pl?identifier=3702.AT4G16250.1](http://string-db.org/newstring_cgi/show_network_section.pl?identifier=3702.AT4G16250.1))

Synonyms

String

Belongs to the phytochrome family.

Sequence Similarities

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:0000155 : phosphorelay sensor kinase activity  
(<https://www.ebi.ac.uk/QuickGO/term/GO:0000155>)  
GO:0009881 : photoreceptor activity (<https://www.ebi.ac.uk/QuickGO/term/GO:0009881>)  
GO - Biological Process

GO:0006355 : regulation of transcription, DNA-templated  
(<https://www.ebi.ac.uk/QuickGO/term/GO:0006355>)  
GO:0018298 : protein-chromophore linkage  
(<https://www.ebi.ac.uk/QuickGO/term/GO:0018298>)  
GO:0009585 : red, far-red light phototransduction  
(<https://www.ebi.ac.uk/QuickGO/term/GO:0009585>)  
GO:0009584 : detection of visible light  
(<https://www.ebi.ac.uk/QuickGO/term/GO:0009584>)

UniProtKB Arabidopsis thaliana

P42497 (<http://www.uniprot.org/uniprot/P42497>)

GenebankID or UniProtKB

X76609 (<https://www.ncbi.nlm.nih.gov/nuccore/X76609>)

GO:0017006 : protein-tetrapyrrole linkage

(<https://www.ebi.ac.uk/QuickGO/term/GO:0017006>)

GO - Cellular Component

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

Presumptive Null

Yes ([#gephebase-summary-title](https://www.gephebase.org/search-criteria?/and+Presumptive+Null=^Yes))

Molecular Type

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

Aberration Type

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

Deletion Size

10-99 bp

Molecular Details of the Mutation

14bp deletion causing premature stop codon

Experimental Evidence

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

Main Reference

A deletion in the PHYD gene of the *Arabidopsis* Wassilewskija ecotype defines a role for phytochrome D in red/far-red light sensing. (1997) (<https://pubmed.ncbi.nlm.nih.gov/9286109/>)

Authors

Aukerman MJ; Hirschfeld M; Wester L; Weaver M; Clack T; Amasino RM; Sharrock RA

Abstract

The PHYD gene of the Wassilewskija (Ws) ecotype of *Arabidopsis* contains a 14-bp deletion (the phyD-1 mutation) beginning at amino acid 29 of the reading frame, resulting in translation termination at a nonsense codon 138 nucleotides downstream of the deletion end point. Immunoblot analyses showed that Ws lacks phyD but contains normal levels of phyA, phyB, and phyC. By backcrossing into the Ws and Landsberg erecta genetic backgrounds, we constructed sibling pairs of PHYD+ and phyD-1 lines and of phyB- PHYD+ and phyB- phyD- lines. Hypocotyl lengths after growth under white or red light increased sequentially in strains that were B+D+, B+D-, B-D+, and B-D-. In the Ws genetic background, an increase in petiole length, a reduction in cotyledon area and in anthocyanin accumulation in seedling stems, a diminished effect of an end-of-day pulse of far-red light on hypocotyl elongation, and a decrease in the number of rosette leaves at the onset of flowering were also seen sequentially in these lines. Thus, phyD, which is approximately 80% identical in amino acid sequence to phyB, acts in conjunction with phyB in regulating many shade avoidance responses. The existence of the apparently naturally occurring phyD-1 mutation indicates that phyD is not essential in some natural environments.

Additional References

## RELATED GEPHE

Related Genes

9 (ACD6 = ACCELERATED CELL DEATH 6, ACS11, AGAMOUS-Like6, AtGA20ox1 (=GA5=Sd1), ERECTA, HUA2, ICARUS1, PAP1, PAP2) ([#gephebase-summary-title\)](https://www.gephebase.org/search-criteria?/or+Taxon+ID=^3702^/and+Trait=Leaf+morphology/or+Taxon+ID=^3702^/and+Trait=Cotyledon+morphology/or+Taxon+ID=^3702^/and+Trait=Coloration/or+Taxon+ID=^3702^/and+Trait=Plant+size/or+Taxon+ID=^3702^/and+Trait=Plant+architecture/and+groupHaplotypes=true)

Related Haplotypes

No matches found.

## EXTERNAL LINKS

## COMMENTS

@Pleiotropy