

GEPHE SUMMARY

AtLURE1 (https://www.gephebase.org/search-criteria?/and+Gene+Gephebase=^AtLURE1^#gephebase-summary-title)	Gephebase Gene	GP00000126	GepheID
Published	Entry Status	Martin	Main curator

PHENOTYPIC CHANGE

Physiology (https://www.gephebase.org/search-criteria?/and+Trait+Category=^Physiology^#gephebase-summary-title)	Trait Category		
Fertilization (pollen-tube attraction by egg) (https://www.gephebase.org/search-criteria?/and+Trait=^Fertilization (pollen-tube attraction by egg)^#gephebase-summary-title)	Trait		
Arabidopsis lyrata	Trait State in Taxon A		
Arabidopsis thaliana	Trait State in Taxon B		
Data not curated	Ancestral State		
Interspecific (https://www.gephebase.org/search-criteria?/and+Taxonomic+Status=^Interspecific^#gephebase-summary-title)	Taxonomic Status		
	Taxon A		Taxon B
Arabidopsis lyrata (https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=^Arabidopsis lyrata^#gephebase-summary-title)	Latin Name	Arabidopsis thaliana (https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=^Arabidopsis thaliana^#gephebase-summary-title)	Latin Name
-	Common Name	thale cress	Common Name
lyrate rockcress; Arabidopsis lyrata (L.) O'Kane & Al-Shehbaz; Arabidopsis_lyrata	Synonyms	thale cress; mouse-ear cress; thale-cress; Arabidopsis thaliana (L.) Heynh.; Arabidopsis thaliana (thale cress); Arabidopsis_thaliana; Arbisopsis thaliana; thale kress	Synonyms
species	Rank	species	Rank
cellular organisms; Eukaryota; Viridiplantae; Streptophyta; Streptophytina; Embryophyta; Tracheophyta; Euphyllophyta; Spermatophyta; Magnoliophyta; Mesangiospermae; eudicotyledons; Gunneridae; Pentapetales; rosids; malvids; Brassicales; Brassicaceae; Camelineae; Arabidopsis	Lineage	cellular organisms; Eukaryota; Viridiplantae; Streptophyta; Streptophytina; Embryophyta; Tracheophyta; Euphyllophyta; Spermatophyta; Magnoliophyta; Mesangiospermae; eudicotyledons; Gunneridae; Pentapetales; rosids; malvids; Brassicales; Brassicaceae; Camelineae; Arabidopsis	Lineage
Arabidopsis () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=3701)	Parent	Arabidopsis () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=3701)	Parent
59689 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=59689)	NCBI Taxonomy ID	3702 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=3702)	NCBI Taxonomy ID
No	is Taxon A an Intraspecies?	No	is Taxon B an Intraspecies?

GENOTYPIC CHANGE

LURE1.1	Generic Gene Name	Q4VP09 (http://www.uniprot.org/uniprot/Q4VP09)	UniProtKB Arabidopsis thaliana
AtLURE1.1; CRP810_1.1; LURE 1.1; At5g43285; MNL12	Synonyms	0	GenebankID or UniProtKB
3702.AT5G43285.1 (http://string-db.org/newstring.cgi/show_network_section.pl?identifier=3702.AT5G43285.1)	String		
Belongs to the DEFL family.	Sequence Similarities		
-	GO - Molecular Function		
GO:0010183 : pollen tube guidance (https://www.ebi.ac.uk/QuickGO/term/GO:0010183)	GO - Biological Process		
GO:0005576 : extracellular region (https://www.ebi.ac.uk/QuickGO/term/GO:0005576)	GO - Cellular Component		

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

Presumptive Null

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

Molecular Type

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

Aberration Type

Gene birth

Molecular Details of the Mutation

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

Experimental Evidence

A species-specific cluster of defensin-like genes encodes diffusible pollen tube attractants in Arabidopsis. (2012) (<https://pubmed.ncbi.nlm.nih.gov/23271953>)

Main Reference

Takeuchi H; Higashiyama T

Authors

Genes directly involved in male/female and host/parasite interactions are believed to be under positive selection. The flowering plant *Arabidopsis thaliana* has more than 300 defensin-like (DEFL) genes, which are likely to be involved in both natural immunity and cell-to-cell communication including pollen-pistil interactions. However, little is known of the relationship between the molecular evolution of DEFL genes and their functions. Here, we identified a recently evolved cluster of DEFL genes in *A. thaliana* and demonstrated that these DEFL (cysteine-rich peptide [CRP810_1]) peptides, named AtLURE1 peptides, are pollen tube attractants guiding pollen tubes to the ovular micropyle. The AtLURE1 genes formed the sole species-specific cluster among DEFL genes compared to its close relative, *A. lyrata*. No evidence for positive selection was detected in AtLURE1 genes and their orthologs, implying neutral evolution of AtLURE1 genes. AtLURE1 peptides were specifically expressed in egg-accompanying synergid cells and secreted toward the funicular surface through the micropyle. Genetic analyses showed that gametophytic mutants defective in micropylar guidance (*myb98*, *magatama3*, and *central cell guidance*) do not express AtLURE1 peptides. Downregulation of the expression of these peptides impaired precise pollen tube attraction to the micropylar opening of some populations of ovules. Recombinant AtLURE1 peptides attracted *A. thaliana* pollen tubes at a higher frequency compared to *A. lyrata* pollen tubes, suggesting that these peptides are species-preferential attractants in micropylar guidance. In support of this idea, the heterologous expression of a single AtLURE1 peptide in the synergid cell of *Torenia fournieri* was sufficient to guide *A. thaliana* pollen tubes to the *T. fournieri* embryo sac and to permit entry into it. Our results suggest the unique evolution of AtLURE1 genes, which are directly involved in male-female interaction among the DEFL multigene family, and furthermore suggest that these peptides are sufficient to overcome interspecific barriers in gametophytic attraction and penetration.

Abstract

Additional References

RELATED GEPHE

No matches found.

Related Genes

No matches found.

Related Haplotypes

EXTERNAL LINKS

COMMENTS

Cluster of small peptide-encoding genes