

GEPHE SUMMARY

Gephebase Gene		GepheID
metal tolerance protein1 (<a +metal+tolerance+protein1+"#gephebase-summary-title"="" href="https://www.gephebase.org/search-criteria?/and+Gene+Gephebase=">https://www.gephebase.org/search-criteria?/and+Gene+Gephebase="+metal+tolerance+protein1+"#gephebase-summary-title)		GP00000652
Entry Status		Martin
Published		Main curator

PHENOTYPIC CHANGE

Trait Category			
Physiology (<a +physiology+"#gephebase-summary-title"="" href="https://www.gephebase.org/search-criteria?/and+Trait+Category=">https://www.gephebase.org/search-criteria?/and+Trait+Category="+Physiology+"#gephebase-summary-title)			
Trait			
Metal tolerance (<a +metal+tolerance+"#gephebase-summary-title"="" href="https://www.gephebase.org/search-criteria?/and+Trait=">https://www.gephebase.org/search-criteria?/and+Trait="+Metal+tolerance+"#gephebase-summary-title)			
Trait State in Taxon A			
Arabidopsis lyrata			
Trait State in Taxon B			
Arabidopsis halleri			
Ancestral State			
Taxon A			
Taxonomic Status			
Interspecific (<a +interspecific+"#gephebase-summary-title"="" href="https://www.gephebase.org/search-criteria?/and+Taxonomic+Status=">https://www.gephebase.org/search-criteria?/and+Taxonomic+Status="+Interspecific+"#gephebase-summary-title)			
Taxon A		Taxon B	
Latin Name		Latin Name	
Arabidopsis lyrata (<a +arabidopsis+lyrata+"#gephebase-summary-title"="" href="https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=">https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms="+Arabidopsis+lyrata+"#gephebase-summary-title)		Arabidopsis halleri (<a +arabidopsis+halleri+"#gephebase-summary-title"="" href="https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=">https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms="+Arabidopsis+halleri+"#gephebase-summary-title)	
Common Name		Common Name	
-		-	
Synonyms		Synonyms	
lyrate rockcross; Arabidopsis lyrata (L.) O’Kane & Al-Shehbaz; Arabidopsis_lyrata		Arabis halleri; Cardaminopsis halleri; Arabidopsis halleri (L.) O’Kane & Al-Shehbaz; Arabis halleri L.; Cardaminopsis halleri (L.) Hayek	
Rank		Rank	
species		species	
Lineage		Lineage	
cellular organisms; Eukaryota; Viridiplantae; Streptophyta; Streptophytina; Embryophyta; Tracheophyta; Euphyllophyta; Spermatophyta; Magnoliophyta; Mesangiospermae; eudicotyledons; Gunneridae; Pentapetales; rosids; malvids; Brassicales; Brassicaceae; Camelineae; Arabidopsis		cellular organisms; Eukaryota; Viridiplantae; Streptophyta; Streptophytina; Embryophyta; Tracheophyta; Euphyllophyta; Spermatophyta; Magnoliophyta; Mesangiospermae; eudicotyledons; Gunneridae; Pentapetales; rosids; malvids; Brassicales; Brassicaceae; Camelineae; Arabidopsis	
Parent		Parent	
Arabidopsis () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=3701)		Arabidopsis () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=3701)	
NCBI Taxonomy ID		NCBI Taxonomy ID	
59689 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=59689)		81970 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=81970)	
is Taxon A an Intraspecies?		is Taxon B an Intraspecies?	
No		No	

GENOTYPIC CHANGE

Generic Gene Name		UniProtKB Arabidopsis thaliana	
MTP1		Q9ZT63 (http://www.uniprot.org/uniprot/Q9ZT63)	
Synonyms		GenebankID or UniProtKB	
A. THALIANA CATION DIFFUSION FACILITATOR 1; ATCDF1; ATMTPT1; F19D11.8; metal tolerance protein 1; MTP1; OVERLY ZINC SENSITIVE 1; OZS1; ZAT1; zinc transporter of Arabidopsis thaliana; ZINC TRANSPORTER OF ARABIDOPSIS THALIANA 1; ZINC TRANSPORTER ZAT; ZAT; At2g46800		AC066691 (https://www.ncbi.nlm.nih.gov/nucleotide/AC066691)	
String			
3702.AT2G46800.1 (http://string-db.org/newstring.cgi/show_network_section.pl?identifier=3702.AT2G46800.1)			
Sequence Similarities			
Belongs to the cation diffusion facilitator (CDF) transporter (TC 2.A.4) family. SLC30A subfamily.			
GO - Molecular Function			
GO:0046872 : metal ion binding (https://www.ebi.ac.uk/QuickGO/term/GO:0046872)			
GO:0005385 : zinc ion transmembrane transporter activity			

(<https://www.ebi.ac.uk/QuickGO/term/GO:0005385>)
GO:0046873 : metal ion transmembrane transporter activity
(<https://www.ebi.ac.uk/QuickGO/term/GO:0046873>)

GO - Biological Process

GO:0006882 : cellular zinc ion homeostasis
(<https://www.ebi.ac.uk/QuickGO/term/GO:0006882>)
GO:0006829 : zinc ion transport (<https://www.ebi.ac.uk/QuickGO/term/GO:0006829>)

GO - Cellular Component

GO:0016021 : integral component of membrane
(<https://www.ebi.ac.uk/QuickGO/term/GO:0016021>)
GO:0016020 : membrane (<https://www.ebi.ac.uk/QuickGO/term/GO:0016020>)
GO:0005774 : vacuolar membrane (<https://www.ebi.ac.uk/QuickGO/term/GO:0005774>)
GO:0005773 : vacuole (<https://www.ebi.ac.uk/QuickGO/term/GO:0005773>)

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~#gephebase-summary-title)	Molecular Type
Complex Change (https://www.gephebase.org/search-criteria?/and+Aberration Type=~Complex Change~#gephebase-summary-title)	Aberration Type
Copy number Variant	Molecular Details of the Mutation
Linkage Mapping (https://www.gephebase.org/search-criteria?/and+Experimental Evidence=~Linkage Mapping~#gephebase-summary-title)	Experimental Evidence
Two genes encoding Arabidopsis halleri MTP1 metal transport proteins co-segregate with zinc tolerance and account for high MTP1 transcript levels. (2004) (https://pubmed.ncbi.nlm.nih.gov/15255871)	Main Reference
DrÄrger DB; Desbrosses-Fonrouge AG; Krach C; Chardonnnens AN; Meyer RC; Saumitou-Laprade P; KrÄrmer U	Authors

The zinc hyperaccumulator plant Arabidopsis halleri is able to naturally accumulate 100-fold higher leaf zinc concentrations when compared with non-accumulator species such as the closely related A. lyrata and A. thaliana, without showing toxicity symptoms. A novel member of the cation diffusion facilitator (CDF) protein family, an A. halleri metal tolerance protein 1 (MTP1), and the homologous A. thaliana Zn transporter (ZAT)/AtMTP1 metal-specifically complement the zinc hypersensitivity of a Saccharomyces cerevisiae zrc1 cot1 mutant strain. A fusion of the AhMTP1 protein to green fluorescent protein (GFP) localizes to the vacuolar membrane of A. thaliana protoplasts. When compared with A. lyrata and A. thaliana, the total MTP1 transcript levels are substantially higher in the leaves and upregulated upon exposure to high zinc concentrations in the roots of A. halleri. The high MTP1 transcript levels in A. halleri can be primarily attributed to two genetically unlinked genomic AhMTP1 gene copies. The two corresponding loci co-segregate with zinc tolerance in the back-cross 1 generation of a cross between the zinc-tolerant species A. halleri and the zinc-sensitive species A. lyrata. In contrast, a third MTP1 gene in the genome of A. halleri generates only minor amounts of MTP1 transcripts and does not co-segregate with zinc tolerance. Our data suggests that zinc tolerance in A. halleri involves an expanded copy number of an ancestral MTP1 gene, encoding functional proteins that mediate the detoxification of zinc in the cell vacuole. At the transcript level, MTP1 gene copies of A. halleri are regulated differentially and in response to changes in zinc supply.	Abstract
Two genes encoding Arabidopsis halleri MTP1 metal transport proteins co-segregate with zinc tolerance and account for high MTP1 transcript levels. (2004) (https://pubmed.ncbi.nlm.nih.gov/15255871)	Additional References

RELATED GEPHE

1 (heavy metal atpase4 (HMA4)) (https://www.gephebase.org/search-criteria?/or+Taxon ID=~59689~/and+Trait=Metal tolerance/or+Taxon ID=~81970~/and+Trait=Metal tolerance/and+groupHaplotypes=true#gephebase-summary-title)	Related Genes
No matches found.	Related Haplotypes

EXTERNAL LINKS

COMMENTS