

## GEPHE SUMMARY

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

## PHENOTYPIC CHANGE

Trait Category		
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)		
Trait		
Metal tolerance ( <a href="https://www.gephebase.org/search-criteria?/and+Trait=^Metal">https://www.gephebase.org/search-criteria?/and+Trait=^Metal</a> )		
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 href="https://www.gephebase.org/search-criteria?/and+Taxonomic">https://www.gephebase.org/search-criteria?/and+Taxonomic</a> )		
Status=^Interspecific^#gephebase-summary-title)		
Taxon A	Taxon B	
Arabidopsis lyrata	Arabidopsis halleri	Latin Name
( <a href="https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=^Arabidopsis">https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=^Arabidopsis</a> )	( <a href="https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=^Arabidopsis">https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=^Arabidopsis</a> )	Latin Name
lyrata^#gephebase-summary-title)	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	
species	halleri L.; Cardaminopsis halleri (L.) Hayek	Rank
Rank	Rank	
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; Pentapetalae; rosids; malvids; Brassicales; Brassicaceae;	eudicotyledons; Gunneridae; Pentapetalae; rosids; malvids; Brassicales; Brassicaceae;	
Camelineae; Arabidopsis	Camelineae; Arabidopsis	
Parent	Parent	
Arabidopsis () - (Rank: genus)	Arabidopsis () - (Rank: genus)	
( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=3701">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=3701</a> )	( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=3701">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=3701</a> )	
NCBI Taxonomy ID	NCBI Taxonomy ID	
59689	81970	
( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=59689">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=59689</a> )	( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=81970">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=81970</a> )	
is Taxon A an Infrappecies?	is Taxon B an Infrappecies?	
No	No	

## GENOTYPIC CHANGE

Generic Gene Name		UniProtKB Arabidopsis thaliana
MTP1	Q9ZT63 ( <a href="http://www.uniprot.org/uniprot/Q9ZT63">http://www.uniprot.org/uniprot/Q9ZT63</a> )	
Synonyms		GenebankID or UniProtKB
A. THALIANA CATION DIFFUSION FACILITATOR 1; ATCDF1; ATMTP1; F19D11.8;	AC066691 ( <a href="https://www.ncbi.nlm.nih.gov/nucleotide/AC066691">https://www.ncbi.nlm.nih.gov/nucleotide/AC066691</a> )	
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		
String		
3702.AT2G46800.1		
( <a href="http://string-db.org/newstring.cgi/show_network_section.pl?identifier=3702.AT2G46800.1">http://string-db.org/newstring.cgi/show_network_section.pl?identifier=3702.AT2G46800.1</a> )		
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 ( <a href="https://www.ebi.ac.uk/QuickGO/term/GO:0046872">https://www.ebi.ac.uk/QuickGO/term/GO:0046872</a> )		
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>)

Presumptive Null

No (<https://www.gephebase.org/search-criteria?/and+Presumptive Null=^No^#gephebase-summary-title>)

Molecular Type

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

Aberration Type

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

Molecular Details of the Mutation

Copy number Variant

Experimental Evidence

Linkage Mapping (<https://www.gephebase.org/search-criteria?/and+Experimental Evidence=^Linkage Mapping^#gephebase-summary-title>)

Main Reference

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>)

Authors

DrÄrger DB; Desbrosses-Fonrouge AG; Krach C; Chardonnes AN; Meyer RC; Saumitou-Laprade P; KrÄrmer U

Abstract

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.

Additional References

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>)

## RELATED GEPHE

Related Genes

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 Haplotypes

No matches found.

## EXTERNAL LINKS

## COMMENTS