

GEPHE SUMMARY

two pore channel (https://www.gephebase.org/search-criteria?/and+Gene+Gephebase=^two+pore+channel^#gephebase-summary-title)	Gephebase Gene	GP00001433	GepheID
Published	Entry Status	Prigent	Main curator

PHENOTYPIC CHANGE

Physiology (https://www.gephebase.org/search-criteria?/and+Trait+Category=^Physiology^#gephebase-summary-title)	Trait Category		
Xenobiotic resistance (soil contamination; serpentine) (https://www.gephebase.org/search-criteria?/and+Trait=^Xenobiotic+resistance+(soil+contamination;+serpentine)^#gephebase-summary-title)	Trait		
Arabidopsis arenosa Hochlantsch & Kasperstein populations not adapted to serpentine	Trait State in Taxon A		
Arabidopsis arenosa Gulsen population adapted to serpentine	Trait State in Taxon B		
	Ancestral State		
Intraspecific (https://www.gephebase.org/search-criteria?/and+Taxonomic+Status=^Intraspecific^#gephebase-summary-title)	Taxonomic Status		
	Taxon A		Taxon B
Arabidopsis arenosa (https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=^Arabidopsis+arenosa^#gephebase-summary-title)	Latin Name	Arabidopsis arenosa (https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=^Arabidopsis+arenosa^#gephebase-summary-title)	Latin Name
-	Common Name	-	Common Name
Arabis arenosa; Cardaminopsis arenosa; Arabidopsis arenosa (L.) Lawalree; Arabis arenosa (L.) Scop.; Cardaminopsis arenosa (L.) Hayek.	Synonyms	Arabis arenosa; Cardaminopsis arenosa; Arabidopsis arenosa (L.) Lawalree; Arabis arenosa (L.) Scop.; Cardaminopsis arenosa (L.) Hayek.	Synonyms
species	Rank	species	Rank
cellular organisms; Eukaryota; Viridiplantae; Streptophyta; Streptophytina; Embryophyta; Tracheophyta; Euphyllophyta; Spermatophyta; Magnoliophyta; Mesangiospermae; eudicotyledons; Gunneridae; Pentapetalae; rosids; malvids; Brassicales; Brassicaceae; Camelineae; Arabidopsis	Lineage	cellular organisms; Eukaryota; Viridiplantae; Streptophyta; Streptophytina; Embryophyta; Tracheophyta; Euphyllophyta; Spermatophyta; Magnoliophyta; Mesangiospermae; eudicotyledons; Gunneridae; Pentapetalae; 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
38785 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=38785)	NCBI Taxonomy ID	38785 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=38785)	NCBI Taxonomy ID
Yes	is Taxon A an Intraspecies?	Yes	is Taxon B an Intraspecies?
Arabidopsis arenosa Hochlantsch & Kasperstein populations not adapted to serpentine	Taxon A Description	Arabidopsis arenosa Gulsen population adapted to serpentine	Taxon B Description

GENOTYPIC CHANGE

TPC1	Generic Gene Name	Q94Kl8 (http://www.uniprot.org/uniprot/Q94Kl8)	UniProtKB Arabidopsis thaliana
ATCCH1; ATTPC1; CALCIUM CHANNEL 1; FATTY ACID OXYGENATION UPREGULATED 2; FOU2; T5L23.5; two-pore channel 1; two-pore channel 1; CCH1; At4g03560; F9H3.19	Synonyms	()	GenebankID or UniProtKB
3702.AT4G03560.1 (http://string-db.org/newstring.cgi/show_network_section.pl?identifier=3702.AT4G03560.1)	String		
Belongs to the calcium channel alpha-1 subunit (TC 1.A.1.11) family. Two pore calcium channel subfamily.	Sequence Similarities		
	GO - Molecular Function		

GO:0042802 : identical protein binding
(<https://www.ebi.ac.uk/QuickGO/term/GO:0042802>)
GO:0005509 : calcium ion binding (<https://www.ebi.ac.uk/QuickGO/term/GO:0005509>)
GO:0005245 : voltage-gated calcium channel activity
(<https://www.ebi.ac.uk/QuickGO/term/GO:0005245>)

GO - Biological Process

GO:0019722 : calcium-mediated signaling
(<https://www.ebi.ac.uk/QuickGO/term/GO:0019722>)
GO:0010119 : regulation of stomatal movement
(<https://www.ebi.ac.uk/QuickGO/term/GO:0010119>)
GO:0034765 : regulation of ion transmembrane transport
(<https://www.ebi.ac.uk/QuickGO/term/GO:0034765>)
GO:0006816 : calcium ion transport (<https://www.ebi.ac.uk/QuickGO/term/GO:0006816>)
GO:0080141 : regulation of jasmonic acid biosynthetic process
(<https://www.ebi.ac.uk/QuickGO/term/GO:0080141>)
GO:0009845 : seed germination (<https://www.ebi.ac.uk/QuickGO/term/GO:0009845>)

GO - Cellular Component

GO:0016021 : integral component of membrane
(<https://www.ebi.ac.uk/QuickGO/term/GO:0016021>)
GO:0005886 : plasma membrane (<https://www.ebi.ac.uk/QuickGO/term/GO:0005886>)
GO:0005774 : vacuolar membrane (<https://www.ebi.ac.uk/QuickGO/term/GO:0005774>)
GO:0005794 : Golgi apparatus (<https://www.ebi.ac.uk/QuickGO/term/GO:0005794>)
GO:0005773 : vacuole (<https://www.ebi.ac.uk/QuickGO/term/GO:0005773>)
GO:0000325 : plant-type vacuole (<https://www.ebi.ac.uk/QuickGO/term/GO:0000325>)

Unknown (<https://www.gephebase.org/search-criteria?/and+Presumptive Null=^Unknown^#gephebase-summary-title>)

Presumptive Null

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

Molecular Type

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

Aberration Type

unknown

Molecular Details of the Mutation

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

Experimental Evidence

Borrowed alleles and convergence in serpentine adaptation. (2016) (<https://pubmed.ncbi.nlm.nih.gov/27357660>)

Main Reference

Arnold BJ; Lahner B; DaCosta JM; Weisman CM; Hollister JD; Salt DE; Bomblies K; Yant L

Authors

Serpentine barrens represent extreme hazards for plant colonists. These sites are characterized by high porosity leading to drought, lack of essential mineral nutrients, and phytotoxic levels of metals. Nevertheless, nature forged populations adapted to these challenges. Here, we use a population-based evolutionary genomic approach coupled with elemental profiling to assess how autotetraploid *Arabidopsis arenosa* adapted to a multichallenge serpentine habitat in the Austrian Alps. We first demonstrate that serpentine-adapted plants exhibit dramatically altered elemental accumulation levels in common conditions, and then resequence 24 autotetraploid individuals from three populations to perform a genome scan. We find evidence for highly localized selective sweeps that point to a polygenic, multitrait basis for serpentine adaptation. Comparing our results to a previous study of independent serpentine colonizations in the closely related diploid *Arabidopsis lyrata* in the United Kingdom and United States, we find the highest levels of differentiation in 11 of the same loci, providing candidate alleles for mediating convergent evolution. This overlap between independent colonizations in different species suggests that a limited number of evolutionary strategies are suited to overcome the multiple challenges of serpentine adaptation. Interestingly, we detect footprints of selection in *A. arenosa* in the context of substantial gene flow from nearby off-serpentine populations of *A. arenosa*, as well as from *A. lyrata*. In several cases, quantitative tests of introgression indicate that some alleles exhibiting strong selective sweep signatures appear to have been introgressed from *A. lyrata*. This finding suggests that migrant alleles may have facilitated adaptation of *A. arenosa* to this multihazard environment.

Abstract

Additional References

RELATED GEPHE

9 (ammonium transporter 2;1, calmodulin binding hydrolase, Casparian strip membrane domain protein 1, early responsive to dehydration stress protein 4, Ferroportin 2, high expression of osmotically responsive genes 2, K⁺ uptake permease 9, LACCASE 8, sulfate transporter 1;1) (<https://www.gephebase.org/search-criteria?/or+Taxon ID=^38785^/and+Trait=Xenobiotic resistance/and+groupHaplotypes=true#gephebase-summary-title>)

Related Genes

No matches found.

Related Haplotypes

EXTERNAL LINKS

COMMENTS

@Introgression convergence with *A lyrata*

