GEPHE SUMMARY

Gephebase Gene
Phosphate transporter PHO1 (https://www.gephebase.org/search-criteria?/and+Gene Gephebase=^Phosphate transporter PHO1^#gephebase-summary-title)

GepheID
GP00001284

Entry Status
Published

Main curator
Arnoult

PHENOTYPIC CHANGE

Trait Category
Morphology (https://www.gephebase.org/search-criteria?/and+Trait Category=^Morphology^#gephebase-summary-title)

Trait
Root growth (allometry of lateral roots) (https://www.gephebase.org/search-criteria?/and+Trait=^Root growth (allometry of lateral roots)^#gephebase-summary-title)

Trait State in Taxon A
Arabidopsis thaliana- 69 accessions

Trait State in Taxon B
Arabidopsis thaliana- 69 accessions

Ancestral State
Unknown

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

Taxon A

Latin Name
Arabidopsis thaliana (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=^Arabidopsis thaliana^#gephebase-summary-title)

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; Viridiplantae; Streptophyta; Streptophytina; Embryophyta; Tracheophyta; Euphyllophyta; Spermatophyta; Magnoliophyta; Mesangiospermae; eudicotyledons; Gunneridae; Pentapetalae; rosids; malvids; Brassicales; Brassicaceae; Camelineae; 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 (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=^Arabidopsis thaliana^#gephebase-summary-title)

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; Viridiplantae; Streptophyta; Streptophytina; Embryophyta; Tracheophyta; Euphyllophyta; Spermatophyta; Magnoliophyta; Mesangiospermae; eudicotyledons; Gunneridae; Pentapetalae; rosids; malvids; Brassicales; Brassicaceae; Camelineae; 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?
No

GENOTYPIC CHANGE

Generic Gene Name
PHO1

Synonyms
ARABIDOPSIS PHOSPHATE 1; ATPHO1; phosphate 1; At3g23430; MLM24.26

String
3702.AT3G23430.1 (http://string-db.org/newstring_cgi/show_network_section.pl?identifier= 3702.AT3G23430.1)

Sequence Similarities
Belongs to the SYG1 (TC 2.A.94) family.

GO - Molecular Function
GO:0000822 : inositol hexakisphosphate binding (https://www.ebi.ac.uk/QuickGO/term/GO:0000822)
GO:0015114 : phosphate ion transmembrane transporter activity (https://www.ebi.ac.uk/QuickGO/term/GO:0015114)

GO - Biological Process
GO:0016036 : cellular response to phosphate starvation

UniProtKB Arabidopsis thaliana
Q8S403 (http://www.uniprot.org/uniprot/Q8S403)

GenebankID or UniProtKB
821924 (https://www.ncbi.nlm.nih.gov/nuccore/821924)

(https://www.ebi.ac.uk/QuickGO/term/GO:0016036)
GO:0048016 : inositol phosphate-mediated signaling
(https://www.ebi.ac.uk/QuickGO/term/GO:0048016)
GO:0006817 : phosphate ion transport
(https://www.ebi.ac.uk/QuickGO/term/GO:0006817)
GO:0006799 : polyphosphate biosynthetic process
(https://www.ebi.ac.uk/QuickGO/term/GO:0006799)

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:0000139 : Golgi membrane (https://www.ebi.ac.uk/QuickGO/term/GO:0000139)
GO:0005794 : Golgi apparatus (https://www.ebi.ac.uk/QuickGO/term/GO:0005794)
GO:0005789 : endoplasmic reticulum membrane
(https://www.ebi.ac.uk/QuickGO/term/GO:0005789)
GO:0005802 : trans-Golgi network (https://www.ebi.ac.uk/QuickGO/term/GO:0005802)

Presumptive Null

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

Molecular Type

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

Aberration Type

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

SNP Coding Change

Nonsynonymous

Molecular Details of the Mutation

histidine to tyrosine @position 8388425 in chromosome III

Experimental Evidence

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

	Taxon A	Taxon B	Position
Codon	-	-	-
Amino-acid	-	-	-

Main Reference

Integration of responses within and across Arabidopsis natural accessions uncovers loci controlling root systems architecture. (2013) (https://pubmed.ncbi.nlm.nih.gov/23980140)

Authors

Rosas U; Cibrian-Jaramillo A; Ristova D; Banta JA; Gifford ML; Fan AH; Zhou RW; Kim GJ; Krouk G; Birnbaum KD; Purugganan MD; Coruzzi GM

Abstract

Phenotypic plasticity is presumed to be involved in adaptive change toward species diversification. We thus examined how candidate genes underlying natural variation across populations might also mediate plasticity within an individual. Our implementation of an integrative "plasticity space" approach revealed that the root plasticity of a single Arabidopsis accession exposed to distinct environments broadly recapitulates the natural variation "space." Genome-wide association mapping identified the known gene PHOSPHATE 1 (PHO1) and other genes such as Root System Architecture 1 (RSA1) associated with differences in root allometry, a highly plastic trait capturing the distribution of lateral roots along the primary axis. The response of mutants in the Columbia-0 background suggests their involvement in signaling key modulators of root development including auxin, abscisic acid, and nitrate. Moreover, genotype-by-environment interactions for the PHO1 and RSA1 genes in Columbia-0 phenocopy the root allometry of other natural variants. This finding supports a role for plasticity responses in phenotypic evolution in natural environments.

Additional References

RELATED GEPHE

Related Genes

4 (AZI1, Brevis radix (BRX), ORGANIC CATION TRANSPORTER 1, Root System Architecture 1) (https://www.gephebase.org/search-criteria?/or+Taxon ID=^3702^/and+Trait=Root growth/and+groupHaplotypes=true#gephebase-summary-title)

Related Haplotypes

No matches found.

EXTERNAL LINKS

COMMENTS

@GxE - no strong demonstration of the putative causal SNP; natural variation between accessions recapitulates phenotypic plasticity in Col-0