GEPHE SUMMARY

Gephebase Gene

RPM1 (https://www.gephebase.org/search-criteria?/and+Gene Gephebase=^RPM1^#gephebase-summary-title)

GepheID

GP00001000

Entry Status

Published

Main curator

Martin

PHENOTYPIC CHANGE

Trait Category

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

Trait

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

Trait State in Taxon A

Arabidopsis thaliana sensitive to Pseudomonas syringae pathovar maculicola

Trait State in Taxon B

Arabidopsis thaliana Col-0 resistant to Pseudomonas syringae pathovar maculicola

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?

Yes

Taxon B Description

Arabidopsis thaliana Col-0 (resistant)

GENOTYPIC CHANGE

Generic Gene Name

RPM1

Synonyms

DISEASE RESISTANCE PROTEIN RPM1; RESISTANCE TO P. SYRINGAE PV MACULICOLA 1; RESISTANCE TO PSEUDOMONAS SYRINGAE 3; RPS3; At3g07040; F17A9.20

String

3702.AT3G07040.1 (http://string-db.org/newstring_cgi/show_network_section.pl?identifier= 3702.AT3G07040.1)

Sequence Similarities

Belongs to the disease resistance NB-LRR family.

GO - Molecular Function

GO:0005524 : ATP binding (https://www.ebi.ac.uk/QuickGO/term/GO:0005524)
GO:0000166 : nucleotide binding (https://www.ebi.ac.uk/QuickGO/term/GO:0000166)

UniProtKB Arabidopsis thaliana

Q39214 (http://www.uniprot.org/uniprot/Q39214)

GenebankID or UniProtKB

X87851 (https://www.ncbi.nlm.nih.gov/nuccore/X87851)

GO:0043531 : ADP binding (https://www.ebi.ac.uk/QuickGO/term/GO:0043531)

GO - Biological Process

GO:0009626 : plant-type hypersensitive response (https://www.ebi.ac.uk/QuickGO/term/GO:0009626)

GO - Cellular Component

GO:0005886 : plasma membrane (https://www.ebi.ac.uk/QuickGO/term/GO:0005886)
GO:0012505 : endomembrane system (https://www.ebi.ac.uk/QuickGO/term/GO:0012505)
GO:0019897 : extrinsic component of plasma membrane (https://www.ebi.ac.uk/QuickGO/term/GO:0019897)

Presumptive Null

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

Molecular Type

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

Aberration Type

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

Indel Size

1-10 kb

Molecular Details of the Mutation

3.7kb indel with a null-state in the sensitive strains

Experimental Evidence

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

Main Reference

Independent deletions of a pathogen-resistance gene in Brassica and Arabidopsis. (1998) (https://pubmed.ncbi.nlm.nih.gov/9861058)

Authors

Grant MR; McDowell JM; Sharpe AG; de Torres Zabala M; Lydiate DJ; Dangl JL

Abstract

Plant disease resistance (R) genes confer race-specific resistance to pathogens and are genetically defined on the basis of intra-specific functional polymorphism. Little is known about the evolutionary mechanisms that generate this polymorphism. Most R loci examined to date contain alternate alleles and/or linked homologs even in disease-susceptible plant genotypes. In contrast, the resistance to Pseudomonas syringae pathovar maculicola (RPM1) bacterial resistance gene is completely absent (rpm1-null) in 5/5 Arabidopsis thaliana accessions that lack RPM1 function. The rpm1-null locus contains a 98-bp segment of unknown origin in place of the RPM1 gene. We undertook comparative mapping of RPM1 and flanking genes in Brassica napus to determine the ancestral state of the RPM1 locus. We cloned two B. napus RPM1 homologs encoding hypothetical proteins with approximately 81% amino acid identity to Arabidopsis RPM1. Collinearity of genes flanking RPM1 is conserved between B. napus and Arabidopsis. Surprisingly, we found four additional B. napus loci in which the flanking marker synteny is maintained but RPM1 is absent. These B. napus rpm1-null loci have no detectable nucleotide similarity to the Arabidopsis rpm1-null allele. We conclude that RPM1 evolved before the divergence of the Brassicaceae and has been deleted independently in the Brassica and Arabidopsis lineages. These results suggest that functional polymorphism at R gene loci can arise from gene deletions.

Additional References

Genome-wide association study of 107 phenotypes in Arabidopsis thaliana inbred lines. (2010) (https://pubmed.ncbi.nlm.nih.gov/20336072)
Dynamics of disease resistance polymorphism at the Rpm1 locus of Arabidopsis. (1999) (https://pubmed.ncbi.nlm.nih.gov/10458161)

RELATED GEPHE

Related Genes

20 (ACD6 = ACCELERATED CELL DEATH 6, ERECTA, RAC1, Resistance related Kinase 1 (RKS1), RLM1, RLM2 cluster, RLM3, RPP1-WsA, RPP1-WsB, RPP1-WsC, RPP13, RPP2A-RPP2B, RPP4, RPP5, RPP8, RPS2, RPS4, RPS5, RRS1, WRR4) (https://www.gephebase.org/search-criteria?/or+Taxon ID=^3702^/and+Trait=Pathogen resistance/and+groupHaplotypes=true#gephebase-summary-title)

Related Haplotypes

No matches found.

EXTERNAL LINKS

COMMENTS