

# GEPHE SUMMARY

AOP3 ( <a href="https://www.gephebase.org/search-criteria/?and+Gene">https://www.gephebase.org/search-criteria/?and+Gene</a> Gephebase=AOP3">#gephebase-summary-title)	Gephebase Gene GP00000096	GepheID 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
Glucosinolate content ( <a href="https://www.gephebase.org/search-criteria/?and+Trait=^Glucosinolate+content^#gephebase-summary-title">https://www.gephebase.org/search-criteria/?and+Trait=^Glucosinolate+content^#gephebase-summary-title</a> )	Trait State in Taxon A
Arabidopsis thaliana- Col0	Trait State in Taxon B
Arabidopsis thaliana- Ler0	Ancestral State
Data not curated	Taxonomic Status
Intraspecific ( <a href="https://www.gephebase.org/search-criteria/?and+Taxonomic">https://www.gephebase.org/search-criteria/?and+Taxonomic</a> Status=^Intraspecific^#gephebase-summary-title)	

Taxon A	Latin Name	Taxon B	Latin Name
Arabidopsis thaliana ( <a href="https://www.gephebase.org/search-criteria/?and+Taxon+and+Synonyms=^Arabidopsis+thaliana^#gephebase-summary-title">https://www.gephebase.org/search-criteria/?and+Taxon+and+Synonyms=^Arabidopsis+thaliana^#gephebase-summary-title</a> )	Common Name	Arabidopsis thaliana ( <a href="https://www.gephebase.org/search-criteria/?and+Taxon+and+Synonyms=^Arabidopsis+thaliana^#gephebase-summary-title">https://www.gephebase.org/search-criteria/?and+Taxon+and+Synonyms=^Arabidopsis+thaliana^#gephebase-summary-title</a> )	Common Name
thale cress	Synonyms	thale cress	Synonyms
thale cress; mouse-ear cress; thale-cress; Arabidopsis thaliana (L.) Heynh.; Arabidopsis thaliana (thale cress); Arabidopsis_thaliana; Arbisopsis thaliana; thale kress		thale cress; mouse-ear cress; thale-cress; Arabidopsis thaliana (L.) Heynh.; Arabidopsis thaliana (thale cress); Arabidopsis_thaliana; Arbisopsis thaliana; thale kress	
species	Rank	species	Rank
	Lineage		Lineage
cellular organisms; Eukaryota; Viriplantae; Streptophyta; Streptophytina; Embryophyta; Tracheophyta; Euphylophyta; Spermatophyta; Magnoliophyta; Mesangiospermae; eudicotyledons; Gunneridae; Pentapetalae; rosids; malvids; Brassicales; Brassicaceae; Camelinae; Arabidopsis		cellular organisms; Eukaryota; Viriplantae; Streptophyta; Streptophytina; Embryophyta; Tracheophyta; Euphylophyta; Spermatophyta; Magnoliophyta; Mesangiospermae; eudicotyledons; Gunneridae; Pentapetalae; rosids; malvids; Brassicales; Brassicaceae; Camelinae; Arabidopsis	
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> )	Parent	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> )	Parent
3702 ( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=3702">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=3702</a> )	NCBI Taxonomy ID	3702 ( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=3702">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=3702</a> )	NCBI Taxonomy ID
Yes	is Taxon A an Infraspecies?	Yes	is Taxon B an Infraspecies?
Arabidopsis thaliana- Col0	Taxon A Description	Arabidopsis thaliana- Ler0	Taxon B Description

## GENOTYPIC CHANGE

	Generic Gene Name	UniProtKB Arabidopsis thaliana
AOP3	Synonyms	Q9ZTA1 ( <a href="http://www.uniprot.org/uniprot/Q9ZTA1">http://www.uniprot.org/uniprot/Q9ZTA1</a> )
T4I9.7; T4I9_7; At4g03050	String	GenebankID or UniProtKB AF069442 ( <a href="https://www.ncbi.nlm.nih.gov/nucleotide/AF069442">https://www.ncbi.nlm.nih.gov/nucleotide/AF069442</a> )
3702.AT4G03050.2 ( <a href="http://string-db.org/newstring_cgi/show_network_section.pl?identifier=3702.AT4G03050.2">http://string-db.org/newstring_cgi/show_network_section.pl?identifier=3702.AT4G03050.2</a> )	Sequence Similarities	
Belongs to the iron/ascorbate-dependent oxidoreductase family.	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:0016706 : oxidoreductase activity, acting on paired donors, with incorporation or reduction of molecular oxygen, 2-oxoglutarate as one donor, and incorporation of one atom each of oxygen into both donors ( <a href="https://www.ebi.ac.uk/QuickGO/term/GO:0016706">https://www.ebi.ac.uk/QuickGO/term/GO:0016706</a> )		

GO:0051213 : dioxygenase activity (<https://www.ebi.ac.uk/QuickGO/term/GO:0051213>)  
GO - Biological Process

GO:0019761 : glucosinolate biosynthetic process  
(<https://www.ebi.ac.uk/QuickGO/term/GO:0019761>)

GO - Cellular Component

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

Presumptive Null

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

Molecular Type

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

Aberration Type

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

Molecular Details of the Mutation

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

Main Reference

Gene duplication in the diversification of secondary metabolism: tandem 2-oxoglutarate-dependent dioxygenases control glucosinolate biosynthesis in *Arabidopsis*. (2001)  
(<https://pubmed.ncbi.nlm.nih.gov/11251105>)

Authors

Kliebenstein DJ; Lambrix VM; Reichelt M; Gershenson J; Mitchell-Olds T

Abstract

Secondary metabolites are a diverse set of plant compounds believed to have numerous functions in plant-environment interactions. The large chemical diversity of secondary metabolites undoubtedly arises from an equally diverse set of enzymes responsible for their biosynthesis. However, little is known about the evolution of enzymes involved in secondary metabolism. We are studying the biosynthesis of glucosinolates, a large group of secondary metabolites, in *Arabidopsis* to investigate the evolution of enzymes involved in secondary metabolism. *Arabidopsis* contains natural variations in the presence of methylsulfinylalkyl, alkenyl, and hydroxyalkyl glucosinolates. In this article, we report the identification of genes encoding two 2-oxoglutarate-dependent dioxygenases that are responsible for this variation. These genes, AOP2 and AOP3, which map to the same position on chromosome IV, result from an apparent gene duplication and control the conversion of methylsulfinylalkyl glucosinolate to either the alkenyl or the hydroxyalkyl form. By heterologous expression in *Escherichia coli* and the correlation of gene expression patterns to the glucosinolate phenotype, we show that AOP2 catalyzes the conversion of methylsulfinylalkyl glucosinolates to alkenyl glucosinolates. Conversely, AOP3 directs the formation of hydroxyalkyl glucosinolates from methylsulfinylalkyl glucosinolates. No ecotype coexpressed both genes. Furthermore, the absence of functional AOP2 and AOP3 leads to the accumulation of the precursor methylsulfinylalkyl glucosinolates. A third member of this gene family, AOP1, is present in at least two forms and found in all ecotypes examined. However, its catalytic role is still uncertain.

Additional References

Understanding the evolution of defense metabolites in *Arabidopsis thaliana* using genome-wide association mapping. (2010) (<https://pubmed.ncbi.nlm.nih.gov/19737743>)

Combining genome-wide association mapping and transcriptional networks to identify novel genes controlling glucosinolates in *Arabidopsis thaliana*. (2011)

(<https://pubmed.ncbi.nlm.nih.gov/21857804>)

## RELATED GEPHE

3 (AOP2, MAM1, CYP81F2) (<https://www.gephebase.org/search-criteria?/or+Taxon+ID=^3702^/and+Trait=Glucosinolate+content/and+groupHaplotypes=true#gephebase-summary-title>)

Related Genes

Related Haplotypes

No matches found.

## EXTERNAL LINKS

## COMMENTS