

GEPHE SUMMARY

	Gephebase Gene		GephelD
phosphoenolpyruvate carboxylase (PEPC) (<a +phosphoenolpyruvate+carboxylase+(pepc)+"#gephebase-summary-title"="" href="https://www.gephebase.org/search-criteria?/and+Gene+Gephebase=">https://www.gephebase.org/search-criteria?/and+Gene+Gephebase="+phosphoenolpyruvate+carboxylase+(PEPC)+"#gephebase-summary-title)	GP00000866		
	Courtier		Main curator
Published	Entry Status		

PHENOTYPIC CHANGE

	Trait Category		
Physiology (<a +physiology+"#gephebase-summary-title"="" href="https://www.gephebase.org/search-criteria?/and+Trait+Category=">https://www.gephebase.org/search-criteria?/and+Trait+Category="+Physiology+"#gephebase-summary-title)		Trait	
C3-C4 photosynthesis (enzymatic properties) (<a +c3-c4+photosynthesis+(enzymatic+properties)+"#gephebase-summary-title"="" href="https://www.gephebase.org/search-criteria?/and+Trait=">https://www.gephebase.org/search-criteria?/and+Trait="+C3-C4+photosynthesis+(enzymatic+properties)+"#gephebase-summary-title)			
	Trait State in Taxon A		
Alloteropsis spp.		Trait State in Taxon B	
Alloteropsis spp.			
	Ancestral State		
Data not curated		Taxonomic Status	
Interspecific (<a +interspecific+"#gephebase-summary-title"="" href="https://www.gephebase.org/search-criteria?/and+Taxonomic+Status=">https://www.gephebase.org/search-criteria?/and+Taxonomic+Status="+Interspecific+"#gephebase-summary-title)			
	Taxon A		Taxon B
	Latin Name		Latin Name
Alloteropsis (<a +alloteropsis+"#gephebase-summary-title"="" href="https://www.gephebase.org/search-criteria?/and+Taxon+Synonyms=">https://www.gephebase.org/search-criteria?/and+Taxon+Synonyms="+Alloteropsis+"#gephebase-summary-title)		Alloteropsis (<a +alloteropsis+"#gephebase-summary-title"="" href="https://www.gephebase.org/search-criteria?/and+Taxon+Synonyms=">https://www.gephebase.org/search-criteria?/and+Taxon+Synonyms="+Alloteropsis+"#gephebase-summary-title)	
-	Common Name	-	Common Name
	Synonyms		Synonyms
Alloteropsis C.Presl, 1830		Alloteropsis C.Presl, 1830	
genus	Rank	genus	Rank
	Lineage		Lineage
cellular organisms; Eukaryota; Viridiplantae; Streptophyta; Streptophytina; Embryophyta; Tracheophyta; Euphyllophyta; Spermatophyta; Magnoliophyta; Mesangiospermae; Liliopsida; Petrosaviidae; commelinids; Poales; Poaceae; PACMAD clade; Panicoideae; Panicodae; Paniceae; Boivinellinae		cellular organisms; Eukaryota; Viridiplantae; Streptophyta; Streptophytina; Embryophyta; Tracheophyta; Euphyllophyta; Spermatophyta; Magnoliophyta; Mesangiospermae; Liliopsida; Petrosaviidae; commelinids; Poales; Poaceae; PACMAD clade; Panicoideae; Panicodae; Paniceae; Boivinellinae	
	Parent		Parent
Boivinellinae () - (Rank: subtribe) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=1293363)		Boivinellinae () - (Rank: subtribe) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=1293363)	
416176 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=416176)	NCBI Taxonomy ID	416176 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=416176)	NCBI Taxonomy ID
	is Taxon A an Intraspecies?		is Taxon B an Intraspecies?
No		No	

GENOTYPIC CHANGE

	Generic Gene Name		UniProtKB Flaveria trinervia
PPCA		P30694 (http://www.uniprot.org/uniprot/P30694)	
	Synonyms		GenebankID or UniProtKB
-		CCA60994 (https://www.ncbi.nlm.nih.gov/nuccore/CCA60994)	
	String		
-			
	Sequence Similarities		
Belongs to the PEPCase type 1 family.			
	GO - Molecular Function		
GO:0008964 : phosphoenolpyruvate carboxylase activity (https://www.ebi.ac.uk/QuickGO/term/GO:0008964)			
	GO - Biological Process		
GO:0006099 : tricarboxylic acid cycle (https://www.ebi.ac.uk/QuickGO/term/GO:0006099)			
GO:0009760 : C4 photosynthesis (https://www.ebi.ac.uk/QuickGO/term/GO:0009760)			
GO:0015977 : carbon fixation (https://www.ebi.ac.uk/QuickGO/term/GO:0015977)			

GO - Cellular Component

GO:0005737 : cytoplasm (<https://www.ebi.ac.uk/QuickGO/term/GO:0005737>)

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

Haplotype of several candidate a.a. ; lateral gene transfer between convergent C4 species

Experimental Evidence

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

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

Main Reference

Adaptive evolution of C(4) photosynthesis through recurrent lateral gene transfer. (2012) (<https://pubmed.ncbi.nlm.nih.gov/22342748>)

Authors

Christin PA; Edwards EJ; Besnard G; Boxall SF; Gregory R; Kellogg EA; Hartwell J; Osborne CP

Abstract

C(4) photosynthesis is a complex trait that confers higher productivity under warm and arid conditions. It has evolved more than 60 times via the co-option of genes present in C(3) ancestors followed by alteration of the patterns and levels of expression and adaptive changes in the coding sequences, but the evolutionary path to C(4) photosynthesis is still poorly understood. The grass lineage Alloteropsis offers unparalleled opportunities for studying C(4) evolution, because it includes a C(3) taxon and five C(4) species that vary significantly in C(4) anatomy and biochemistry. Using phylogenetic analyses of nuclear genes and leaf transcriptomes, we show that fundamental elements of the C(4) pathway in the grass lineage Alloteropsis were acquired via a minimum of four independent lateral gene transfers from C(4) taxa that diverged from this group more than 20 million years ago. The transfer of genes that were already fully adapted for C(4) function has occurred periodically over at least the last 10 million years and has been a recurrent source for the optimization of the C(4) pathway. This report shows that plant-plant lateral nuclear gene transfers can be a potent source of genetic novelty and adaptation in flowering plants.

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Additional References

RELATED GEPHE

Related Genes

No matches found.

Related Haplotypes

No matches found.

EXTERNAL LINKS

COMMENTS

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