

## GEPHE SUMMARY

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

## PHENOTYPIC CHANGE

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

## GENOTYPIC CHANGE

	Generic Gene Name	UniProtKB Flaveria trinervia
PPCA	Synonyms	GenebankID or UniProtKB
-	String	
-	Sequence Similarities	
Belongs to the PEPCase type 1 family.	GO - Molecular Function	
GO:0008964 : phosphoenolpyruvate carboxylase activity ( <a href="https://www.ebi.ac.uk/QuickGO/term/GO:0008964">https://www.ebi.ac.uk/QuickGO/term/GO:0008964</a> )	GO - Biological Process	
GO:0006099 : tricarboxylic acid cycle ( <a href="https://www.ebi.ac.uk/QuickGO/term/GO:0006099">https://www.ebi.ac.uk/QuickGO/term/GO:0006099</a> )		
GO:0009760 : C4 photosynthesis ( <a href="https://www.ebi.ac.uk/QuickGO/term/GO:0009760">https://www.ebi.ac.uk/QuickGO/term/GO:0009760</a> )		
GO:0015977 : carbon fixation ( <a href="https://www.ebi.ac.uk/QuickGO/term/GO:0015977">https://www.ebi.ac.uk/QuickGO/term/GO:0015977</a> )		

## 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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