

GEPHE SUMMARY

	Gephebase Gene		GepheID
AIM22 (https://www.gephebase.org/search-criteria?/and+GeneGephebase=^AIM22^#gephebase-summary-title)		GP00000073	
	Entry Status	Martin	Main curator
Published			

PHENOTYPIC CHANGE

	Trait Category		
Physiology (https://www.gephebase.org/search-criteria?/and+TraitCategory=^Physiology^#gephebase-summary-title)			
	Trait		
F2 lethality (https://www.gephebase.org/search-criteria?/and+Trait=^F2lethality^#gephebase-summary-title)			
	Trait State in Taxon A		
Saccharomyces cerevisiae			
	Trait State in Taxon B		
Saccharomyces bayanus			
	Ancestral State		
Data not curated			
	Taxonomic Status		
Interspecific (https://www.gephebase.org/search-criteria?/and+TaxonomicStatus=^Interspecific^#gephebase-summary-title)			
	Taxon A		Taxon B
	Latin Name		Latin Name
Saccharomyces cerevisiae (https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=^Saccharomycescerevisiae^#gephebase-summary-title)		Saccharomyces bayanus (https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=^Saccharomycesbayanus^#gephebase-summary-title)	
	Common Name		Common Name
baker’s yeast		-	
	Synonyms		Synonyms
Saccharomyces capensis; Saccharomyces italicus; Saccharomyces oviformis; Saccharomyces uvarum var. melibiosus; baker’s yeast; S. cerevisiae; brewer’s yeast; ATCC 18824; ATCC:18824; CBS 1171; CBS:1171; NRRL Y-12632; NRRL:Y:12632; Saccaromyces cerevisiae; Saccharomyce cerevisiae; Saccharomyes cerevisiae; Sccharomyces cerevisiae		Saccharomyces bayanus var. bayanus; BCRC:21960; CBS 380; CBS:380; CCRC 21960; CCRC:21960; CLIB 181; CLIB:181; DBVPG 6171; DBVPG:6171; DSM 70412; DSM:70412; IFO 11022; IFO 1127; IFO:11022; IFO:1127; IGC 4456; IGC:4456; JCM 7258; JCM:7258; NCYC 2578; NCYC:2578; NRRL Y-12624; NRRL:Y:12624	
	Rank		Rank
species		species	
	Lineage		Lineage
cellular organisms; Eukaryota; Opisthokonta; Fungi; Dikarya; Ascomycota; saccharomyceta; Saccharomycotina; Saccharomycetes; Saccharomycetales; Saccharomycetaceae; Saccharomyces		cellular organisms; Eukaryota; Opisthokonta; Fungi; Dikarya; Ascomycota; saccharomyceta; Saccharomycotina; Saccharomycetes; Saccharomycetales; Saccharomycetaceae; Saccharomyces	
	Parent		Parent
Saccharomyces () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 4930)		Saccharomyces () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 4930)	
	NCBI Taxonomy ID		NCBI Taxonomy ID
4932 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 4932)		4931 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 4931)	
	is Taxon A an Intraspecies?		is Taxon B an Intraspecies?
No		No	

GENOTYPIC CHANGE

	Generic Gene Name		UniProtKB Saccharomyces cerevisiae (strain ATCC 204508 / S288c)
AIM22		P47051 (http://www.uniprot.org/uniprot/P47051)	
	Synonyms		GenebankID or UniProtKB
LIP3; RRG3; YJL046W; J1171		KZV10230 (https://www.ncbi.nlm.nih.gov/nuccore/KZV10230)	
	String		
4932.YJL046W (http://string-db.org/newstring.cgi/show_network_section.pl?identifier= 4932.YJL046W)			
	Sequence Similarities		
Belongs to the LpIA family.			
	GO - Molecular Function		
GO:0005524 : ATP binding (https://www.ebi.ac.uk/QuickGO/term/GO:0005524)			
GO:0016979 : lipoate-protein ligase activity (https://www.ebi.ac.uk/QuickGO/term/GO:0016979)			
	GO - Biological Process		
GO:0009249 : protein lipoylation (https://www.ebi.ac.uk/QuickGO/term/GO:0009249)			
	GO - Cellular Component		

GO:0005739 : mitochondrion (<https://www.ebi.ac.uk/QuickGO/term/GO:0005739>)

Presumptive Null

No ([https://www.gephebase.org/search-criteria?/and+Presumptive Null=~No^#gephebase-summary-title](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](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](https://www.gephebase.org/search-criteria?/and+Aberration+Type=~SNP^#gephebase-summary-title))

SNP Coding Change

Nonsynonymous

Molecular Details of the Mutation

Several candidate non-synonymous changes - exact causing mutation(s) unknown

Experimental Evidence

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

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

Main Reference

Multiple molecular mechanisms cause reproductive isolation between three yeast species. (2010) (<https://pubmed.ncbi.nlm.nih.gov/20652018>)

Authors

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Abstract

Nuclear-mitochondrial conflict (cytonuclear incompatibility) is a specific form of Dobzhansky-Muller incompatibility previously shown to cause reproductive isolation in two yeast species. Here, we identified two new incompatible genes, MRS1 and AIM22, through a systematic study of F2 hybrid sterility caused by cytonuclear incompatibility in three closely related *Saccharomyces* species (*S. cerevisiae*, *S. paradoxus*, and *S. bayanus*). Mrs1 is a nuclear gene product required for splicing specific introns in the mitochondrial COX1, and Aim22 is a ligase encoded in the nucleus that is required for mitochondrial protein lipoylation. By comparing different species, our result suggests that the functional changes in MRS1 are a result of coevolution with changes in the COX1 introns. Further molecular analyses demonstrate that three nonsynonymous mutations are responsible for the functional differences of Mrs1 between these species. Functional complementation assays to determine when these incompatible genes altered their functions show a strong correlation between the sequence-based phylogeny and the evolution of cytonuclear incompatibility. Our results suggest that nuclear-mitochondrial incompatibility may represent a general mechanism of reproductive isolation during yeast evolution.

Additional References

RELATED GEPHE

Related Genes

1 (MRS1) ([https://www.gephebase.org/search-criteria?/or+Taxon ID=~4932^/and+Trait=F2 lethality/or+Taxon ID=~4931^/and+Trait=F2 lethality/and+groupHaplotypes=true#gephebase-summary-title](https://www.gephebase.org/search-criteria?/or+Taxon+ID=~4932^/and+Trait=F2+lethality/or+Taxon+ID=~4931^/and+Trait=F2+lethality/and+groupHaplotypes=true#gephebase-summary-title))

Related Haplotypes

No matches found.

EXTERNAL LINKS

COMMENTS