

## GEPHE SUMMARY

<p>GPX2 (<a href="https://www.gephebase.org/search-criteria?/and+Gene+Gephebase=^GPX2^#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Gene+Gephebase=^GPX2^#gephebase-summary-title</a>)</p> <p>Published</p>	<p>Gephebase Gene</p> <p>Entry Status</p>	<p>GP00001310</p> <p>Arnoult</p>	<p>GepheID</p> <p>Main curator</p>
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## PHENOTYPIC CHANGE

<p>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>)</p>		<p>Trait Category</p>		
<p>Xenobiotic resistance (citrinin) (<a href="https://www.gephebase.org/search-criteria?/and+Trait=^Xenobiotic+resistance+(citrinin)^#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Trait=^Xenobiotic+resistance+(citrinin)^#gephebase-summary-title</a>)</p>		<p>Trait</p>		
<p>Saccharomyces cerevisiae S288c</p>		<p>Trait State in Taxon A</p>		
<p>Saccharomyces paradoxus CBS432</p>		<p>Trait State in Taxon B</p>		
<p>Taxon A</p>		<p>Ancestral State</p>		
<p>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>)</p>		<p>Taxonomic Status</p>		
<p>Taxon A</p>	<p>Latin Name</p>	<p>Taxon B</p>	<p>Latin Name</p>	
<p>Saccharomyces cerevisiae (<a href="https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=^Saccharomyces+cerevisiae^#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=^Saccharomyces+cerevisiae^#gephebase-summary-title</a>)</p>	<p>Saccharomyces paradoxus (<a href="https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=^Saccharomyces+paradoxus^#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=^Saccharomyces+paradoxus^#gephebase-summary-title</a>)</p>			
<p>baker's yeast</p>	<p>Common Name</p>	<p>-</p>	<p>Common Name</p>	
<p>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; Saccharomyces cerevisiae; Saccharomyce cerevisiae; Saccharomyes cerevisiae; Sccharomyces cerevisiae</p>	<p>Synonyms</p>	<p>AS 2.2401; AS:2.2401; BCRC:22587; CBS 432; CBS:432; CCRC 22587; CCRC:22587; CLIB 228; CLIB:228; DBVPG 6411; DBVPG:6411; IFO 10609; IFO:10609; IGC 4570; IGC:4570; MUCL 31498; MUCL:31498; NCYC 2600; NCYC:2600; NRRL Y-17217; NRRL:Y:17217; PYCC 4570; PYCC:4570</p>	<p>Synonyms</p>	
<p>species</p>	<p>Rank</p>	<p>species</p>	<p>Rank</p>	
<p>cellular organisms; Eukaryota; Opisthokonta; Fungi; Dikarya; Ascomycota; saccharomyceta; Saccharomycotina; Saccharomycetes; Saccharomycetales; Saccharomycetaceae; Saccharomyces</p>	<p>Lineage</p>	<p>cellular organisms; Eukaryota; Opisthokonta; Fungi; Dikarya; Ascomycota; saccharomyceta; Saccharomycotina; Saccharomycetes; Saccharomycetales; Saccharomycetaceae; Saccharomyces</p>	<p>Lineage</p>	
<p>Saccharomyces () - (Rank: genus) (<a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=4930">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=4930</a>)</p>	<p>Parent</p>	<p>Saccharomyces () - (Rank: genus) (<a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=4930">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=4930</a>)</p>	<p>Parent</p>	
<p>4932 (<a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=4932">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=4932</a>)</p>	<p>NCBI Taxonomy ID</p>	<p>27291 (<a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=27291">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=27291</a>)</p>	<p>NCBI Taxonomy ID</p>	
<p>Yes</p>	<p>is Taxon A an Intraspecies?</p>	<p>Yes</p>	<p>is Taxon B an Intraspecies?</p>	
<p>Saccharomyces cerevisiae S288c</p>	<p>Taxon A Description</p>	<p>Saccharomyces paradoxus CBS432</p>	<p>Taxon B Description</p>	

## GENOTYPIC CHANGE

<p>GPX2</p>	<p>Generic Gene Name</p>	<p>UniProtKB Saccharomyces cerevisiae (strain ATCC 204508 / S288c) P38143 (<a href="http://www.uniprot.org/uniprot/P38143">http://www.uniprot.org/uniprot/P38143</a>)</p>
<p>AMI1; YBR244W; YBR1632</p>	<p>Synonyms</p>	<p>GenebankID or UniProtKB</p>
<p>4932.YBR244W (<a href="http://string-db.org/newstring.cgi/show_network_section.pl?identifier=4932.YBR244W">http://string-db.org/newstring.cgi/show_network_section.pl?identifier=4932.YBR244W</a>)</p>	<p>String</p>	<p>0</p>
<p>Belongs to the glutathione peroxidase family.</p>	<p>Sequence Similarities</p>	
<p>GO:0004602 : glutathione peroxidase activity (<a href="https://www.ebi.ac.uk/QuickGO/term/GO:0004602">https://www.ebi.ac.uk/QuickGO/term/GO:0004602</a>)</p> <p>GO:0051920 : peroxiredoxin activity (<a href="https://www.ebi.ac.uk/QuickGO/term/GO:0051920">https://www.ebi.ac.uk/QuickGO/term/GO:0051920</a>)</p> <p>GO:0047066 : phospholipid-hydroperoxide glutathione peroxidase activity</p>	<p>GO - Molecular Function</p>	

(<https://www.ebi.ac.uk/QuickGO/term/GO:0047066>)

GO - Biological Process

GO:0034599 : cellular response to oxidative stress

(<https://www.ebi.ac.uk/QuickGO/term/GO:0034599>)

GO - Cellular Component

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

GO:0005634 : nucleus (<https://www.ebi.ac.uk/QuickGO/term/GO:0005634>)

GO:0031315 : extrinsic component of mitochondrial outer membrane

(<https://www.ebi.ac.uk/QuickGO/term/GO:0031315>)

GO:0031314 : extrinsic component of mitochondrial inner membrane

(<https://www.ebi.ac.uk/QuickGO/term/GO:0031314>)

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=))

Molecular Type

Cis-regulatory ([https://www.gephebase.org/search-criteria?/and+Molecular Type="+Cis-regulatory+"#gephebase-summary-title](https://www.gephebase.org/search-criteria?/and+Molecular+Type=))

Aberration Type

Unknown ([https://www.gephebase.org/search-criteria?/and+Aberration Type="+Unknown+"#gephebase-summary-title](https://www.gephebase.org/search-criteria?/and+Aberration+Type=))

Molecular Details of the Mutation

mutations within 1kb in promotor region

Experimental Evidence

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

Main Reference

Dissecting the Genetic Basis of a Complex cis-Regulatory Adaptation. (2015) (<https://pubmed.ncbi.nlm.nih.gov/26713447>)

Authors

Naranjo S; Smith JD; Artieri CG; Zhang M; Zhou Y; Palmer ME; Fraser HB

Abstract

Although single genes underlying several evolutionary adaptations have been identified, the genetic basis of complex, polygenic adaptations has been far more challenging to pinpoint. Here we report that the budding yeast *Saccharomyces paradoxus* has recently evolved resistance to citrinin, a naturally occurring mycotoxin. Applying a genome-wide test for selection on cis-regulation, we identified five genes involved in the citrinin response that are constitutively up-regulated in *S. paradoxus*. Four of these genes are necessary for resistance, and are also sufficient to increase the resistance of a sensitive strain when over-expressed. Moreover, cis-regulatory divergence in the promoters of these genes contributes to resistance, while exacting a cost in the absence of citrinin. Our results demonstrate how the subtle effects of individual regulatory elements can be combined, via natural selection, into a complex adaptation. Our approach can be applied to dissect the genetic basis of polygenic adaptations in a wide range of species.

Additional References

## RELATED GEPHE

Related Genes

15 (APJ1, ERG3, ERG5, ERG6, ERG7, LEU2, PHO84, RAD5, SWS2, TSA2, CIS1, FRM2, RTA1, cytochrome b, MKT1) (<https://www.gephebase.org/search-criteria?/or+Taxon>

ID="4932"/and+Trait=Xenobiotic+resistance/or+Taxon ID="27291"/and+Trait=Xenobiotic+resistance/and+groupHaplotypes=true#gephebase-summary-title)

Related Haplotypes

No matches found.

## EXTERNAL LINKS

## COMMENTS

A total of 4 genes involved in resistance to citrinin found in this study