Data Integration Through Allele Curation at SGD

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The *Saccharomyces* Genome Database (SGD; www.yeastgenome.org) is a model organism database with a goal of painting a complete picture of eukaryotic cellular processes by curating a comprehensive and diverse collection of data types for the budding yeast *Saccharomyces cerevisiae*. In addition to other data, we also have been capturing single mutant phenotypes as well as importing genetic and physical protein-protein interactions from BioGRID (thebiogrid.org) to help shed light on the role proteins play in cellular processes. While we have been collecting mutant types since we started annotating mutant phenotypes, we more recently decided to capture mutant alleles broadly and systematically. Users can now search for and find alleles associated with their genes of interest. In addition, pages dedicated to single alleles are now available and include information on allele type, molecular details of the mutation, alias names and associated references, along with all phenotype and interaction annotations where specific alleles were used. Alleles that share phenotype and/or genetic interaction annotations are graphical represented in the 'Shared Alleles' section. Users will be able explore more fully previously unlinked data types using our new allele curation model to gain additional insight into cellular processes and pathways. This work is supported by a grant from the NHGRI (U41 HG001315).

Alleles to References

Reference: **Costanzo M, et al. (2016)** A global genetic interaction networ
a wiring diagram of cellular function. *Science* 353(6306)

Abstract

Reference: Costanzo M, et al. (2016)
Abstract
Related References
Gene Ontology Annotations
Phenotype Annotations
Interaction Annotations
Published Datasets
Downloadable Files

We generated a global genetic interaction network for Saccharomyces cerevisiae, constructing more than 23 million
mutants, identifying about 550,000 negative and about 350,000 positive genetic interactions. This comprehensive ne
maps genetic interactions for essential gene pairs, highlighting essential genes as densely connected hubs. Genetic int
profiles enabled assembly of a hierarchical model of cell function, including modules corresponding to protein comple
pathways, biological processes, and cellular compartments. Negative interactions connected functionally related gen
core bioprocesses, and identified pleiotropic genes, whereas positive interactions often mapped general regulatory c
among gene pairs, rather than shared functionality. The global network illustrates how coherent sets of genetic intera
connect protein complex and pathway modules to map a functional wiring diagram of the cell.

PMID: 27708008 DOI full text PMC full text PubMed

Download Citation (.nbib)

Reference Type: Journal Article | Research Support, N.I.H., Extramural
Authors: Costanzo M, VanderSluis B, Koch EN, Baryshnikova A, Pons C, Tan G, Wang W, Usaj M, Hanch
SD, ... Show all
Primary Lit For: BAP2 | CFT2 | CSF1 | DLT1 | GAP1 | IPA1 | MAY24 | MTC2 | MTC4 | MTC6 | PBR1 | ... Show
Additional Lit For: aac1-Δ | aac3-Δ | aad10-Δ | aad14-Δ | aad15-Δ | aad16-Δ | aad3-Δ | aad4-Δ | aad6-Δ | aah1-
| aap1-Δ | aar2-5001 | aat1-Δ | aat2-Δ | abd1-5 | abd1-8 | abf1-102 | abf1-102-supp1 | abf1-
abf2-Δ | abm1-Δ | abp1-Δ | abp140-Δ | abz1-Δ | abz2-Δ | aca1-Δ | acb1-Δ | acc1-5007-supp1
acc1-5009-supp1 | ace2-Δ | acf2-Δ | acf4-Δ | ach1-Δ | ack1-Δ | act1-supp1 | acl4-Δ | acm1-Δ
acs1-Δ | acs2-5002 | acs2-5003 | act1-101 | act1-105 | act1-108 | act1-111 | act1-112 | act1

Discover Alleles

YeastMine Query

SGD YeastMine — Search and retrieve *S. cerevisiae* data with YeastMine, populated by SGD and powered by InterMine.
Data Updated on: Jul-26-2022
Home | Templates | Lists | QueryBuilder | Tools | Regions | Data Sources | API | MyMine | Contact Us | Video Tutorials | Help | Log in
Search: e.g. act1 GO
Genes → Alleles
Retrieve alleles of a given gene.
Gene
LOOKUP: act1 for Organism:
constrain to be IN saved Gene list ALL_Verified_Uncharacterized_Dubious_ORFs
Show Results Edit Query
web service URL | Perl | Python | Ruby | Java [help] | export XML

Search

Saccharomyces GENOME DATABASE — Analyze | Sequence | Function | Literature | Community | search: actin, kinase, glu
278,884 results
Page 1 of 11,156 Results 25 Sort By Relevance

Categories	
References	110,171
Downloads	73,528
Biological Processes	25,324
Alleles	19,043
Colleagues	12,476
Molecular Functions	11,756

Ribaud, Virginie — Colleague
rsc58-Δ — Allele

Allele-centric Page

Summary | Literature

Allele: act1-111
Overview
Phenotype Annotations
Interaction Annotations
Shared Alleles
References
Resources

Allele: act1-111

Allele Name: act1-111
SGD ID: SGD:S000277367
Aliases: act1-D222A,E224A,E226A
Affected Gene: ACT1
Allele Type: missense variant [1]
Description: D222A, E224A, E226A; mutant can be rescued by small molecule trimethylamine N-oxide (TMAO) [1]

Phenotype Annotations

2 entries for 2 phenotypes

Filter table

Gene	Phenotype	Experiment Type	Mutant Information	Strain Background	Chemical	Details	Reference
ACT1	mitochondrial morphology: abnormal	classical genetics	conditional **Allele:** act1-111	Other		**Temperature:** elevated temperature, 37 °C	Reggiori F, et al. (2005) PMID:16221887
ACT1	protein/peptide modification: absent **Reporter:** Ape1p (API)	classical genetics	conditional **Allele:** act1-111	Other		**Temperature:** elevated temperature, 37 °C **Details:** pro-aminopeptidase I (API) is not processed to mature API, indicative of a CVT pathway defect	Reggiori F, et al. (2005) PMID:16221887

Showing 1 to 2 of 2 entries 10 records per page « 1 »

Download (.txt)

Genetic Interaction Annotations

360 entries for 344 genes

Filter table

Interactor	Interactor	Allele	Assay	Annotation	Action	Phenotype	SGA score	P-value	Reference
ACT1	ABM1	abm1-Δ, act1-111	Negative Genetic	high-throughput	Hit-Bait		-0.1994	0.0002859	Costanzo M, et al. (2016) PMID:27708008
ACT1	ACK1	ack1-Δ, act1-111	Negative Genetic	high-throughput	Hit-Bait		-0.1474	0.04338	Costanzo M, et al. (2016) PMID:27708008
TFC3	ACT1	tfc3-g349e, act1-111	Negative Genetic	high-throughput	Bait-Hit		-0.1485	0.03476	Costanzo M, et al. (2016) PMID:27708008
STU1	ACT1	stu1-5, act1-111	Negative Genetic	high-throughput	Bait-Hit		-0.2487	0.000004577	Costanzo M, et al. (2016) PMID:27708008
PKC1	ACT1	pkc1-4, act1-111	Negative Genetic	high-throughput	Bait-Hit		-0.174	0.02246	Costanzo M, et al. (2016) PMID:27708008
PBP2	ACT1	rer2-5008	Negative	high-	Bait-		-0.1784	0.003515	Costanzo M, et al. (2016)

Alleles to Locus Data

Locus Page

Summary | Sequence | Protein | Gene Ontology | Phenotype | Disease | Interactions | Regulation | Expression | Liter
ACT1 / YFL039C
Locus Overview
Sequence
Protein
Alleles
Gene Ontology

ACT1 / YFL039C Overview

Standard Name: ACT1
Systematic Name: YFL039C
SGD ID: SGD:S000001855
Aliases: ABY1 , END7
Feature Type: ORF , Verified

ACT1 / YFL039C
Locus Overview
Sequence
Protein
Alleles

Alleles

act1-1 | act1-101 | act1-102 | act1-103 | act1-104 | act1-105 | act1-106 | ... Show all
View all ACT1 alleles in SGD search | YeastMine

Gene Ontology

Phenotype Page

Summary | Sequence | Protein | Gene Ontology | Phenotype | Disease | Interactions | Regulation | Expression | Literature | Homology
ACT1 / YFL039C
Phenotype Overview
Annotations
Shared

ACT1 / YFL039C Phenotype — Phenotype Help

Summary: Essential gene; conditional mutants show pleiotropic defects including abnormal actin cytoskeleton, chromosome instability, altered subcellular morphology, increased sensitivity to heat, multiple chemicals and osmotic stress; overexpression leads to growth arrest

Annotations — 94 entries for 38 phenotypes

Filter table

Phenotype	Experiment Type	Mutant Information	Strain Background	Chemical	Details	Reference
actin cytoskeleton morphology: abnormal	classical genetics	conditional **Allele:** act1-S14A	Other		**Temperature:** elevated temperature, 37 °C **Details:** actin cables disappear and cortical actin patches become delocalized	Chen X and Rubenstein PA (1995) PMID:7744777
actin cytoskeleton morphology: abnormal	classical genetics	reduction of function **Allele:** act1-K118M	Other		**Details:** K118M cables are fragmented and lack any dominant orientation, resulting in a meshwork	Kruth KA and Rubenstein PA (2012) PMID:22718764

Interactions Page

Summary | Sequence | Protein | Gene Ontology | Phenotype | Disease | Interactions | Regulation | Expression | Literature | Homology
ACT1 / YFL039C
Interactions Overview
Genetic

ACT1 / YFL039C Interactions — Interaction Help

Source: All physical and genetic interaction annotations listed in SGD are curated by BioGRID.

Genetic Interactions

Genetic Interactions — 8063 entries for 2247 genes

Filter table

Interactor	Allele	Assay	Annotation	Action	Phenotype	SGA score	P-value	Reference
AAC3	aac3-Δ, act1-111	Negative Genetic	high-throughput	Hit		-0.1484	0.01119	Costanzo M, et al. (2016) PMID:27708008
AAD10	aad10-Δ, act1-124	Negative Genetic	high-throughput	Hit		-0.1214	0.01925	Costanzo M, et al. (2016) PMID:27708008
AAD14	aad14-Δ, act1-3	Negative Genetic	high-throughput	Hit		-0.1312	0.03328	Costanzo M, et al. (2016) PMID:27708008

Retrieving Allele Data

Saccharomyces GENOME DATABASE — MENU — search: actin, kinase, glucose

Show all categories

Alleles

References
Costanzo M, et al. (2016) 1
Wertman KF, et al. (1992) 15
Drubin DG, et al. (1993) 13
Ramesh R, et al. (2021) 11
Viggiano S, et al. (2010) 6
Show more

Allele Types
gene variant 39
missense variant 19
frameshift variant 5
feature ablation 1

Allele Loci
ACT1 64

Phenotypes
resistance to chemicals: decreased 8
inviable 6
protein/peptide modification: absent 5
heat sensitivity: increased 5
vegetative growth: decreased rate 4
Show more

64 results for "act1-" Allele
Page 1 of 3 Results 25 Sort By Relevance

act1-129 — Allele
synonyms: act1-R177A,D179A
allele loci: ACT1
name: act1-129

act1-111 — Allele
synonyms: act1-D222A,E224A,E226A
allele loci: ACT1
name: act1-111

act1-105 — Allele
synonyms: act1-E311A,R312A
allele loci: ACT1
name: act1-105

act1-136 — Allele
name: act1-136
allele loci: ACT1

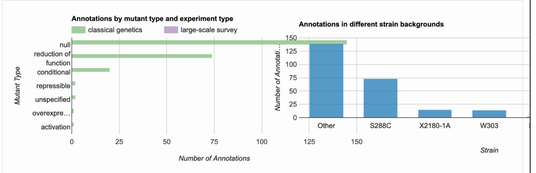
act1-125 — Allele
name: act1-125
allele loci: ACT1

Associated Phenotypes

Phenotype: protein/peptide modification: absent
Overview
Annotations

Phenotype: protein/peptide modification: absent

Observable: protein/peptide modification
Qualifier: absent



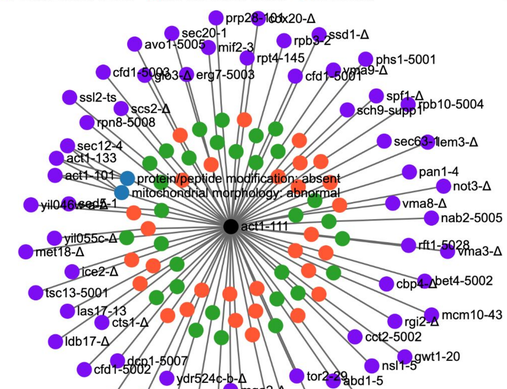
Annotations — 245 entries for 104 genes

Filter table

Gene	Phenotype	Experiment Type	Mutant Information	Strain Background	Chemical	Details	Reference
ACT1	protein/peptide modification: absent **Reporter:** Ape1p (API)	classical genetics	conditional **Allele:** act1-111	Other		**Temperature:** elevated temperature, 37 °C **Details:** pro-aminopeptidase I (API) is not processed to mature API, indicative of a CVT pathway defect	Reggiori F, et al. (2005) PMID:16221887
ACT1	protein/peptide modification: absent **Reporter:** Ape1p (API)	classical genetics	conditional **Allele:** act1-101	Other		**Temperature:** elevated temperature, 37 °C **Details:** pro-aminopeptidase I (API) is not processed to mature API, indicative of a CVT pathway defect	Reggiori F, et al. (2005) PMID:16221887

Shared Alleles

FOCUS | ALLELE | POSITIVE INTERACTION | NEGATIVE INTERACTION | PHENOTYPE — SGD 2022-08-01



All | Positive Interactions | Negative Interactions | Phenotypes — Download (.png)

References

1. Hassell DS, et al. (2021) Chemical rescue of mutant proteins in living Saccharomyces cerevisiae cells by naturally occurring small molecules. G3 (Bethesda) 11(9) PMID: 34544143
SGD Paper DOI full text PMC full text PubMed

Resources

Mutant Strains
Addgene Plasmids | DNASU Plasmids | PlasmID | Thermo Scientific | YGRC

Phenotype Resources
dHITS | FitDB | HIPHOP Chemogenomics | HIP HOP Profiles | PhenoM | PROPHECY | SCMD | ScreenTroll | TheCellVision

Ontology
Yeast Phenotype Ontology

Interactions Resources
BioGRID | CYC2008 | DIP | GeneMANIA | IMP | InterologFinder | ModelArchive | TheCellMap | YeastRC Mass Spec | YeastRC Two-Hybrid