

Table S1. *S. cerevisiae* strains

Strain	Genotype
FY76	<i>MATa lys2-128δ</i>
FY3045	<i>MATa his3Δ200 ura3Δ0 leu2Δ0 trp1Δ63 lys2-128δ bph1Δ::kanMX-UAS_{GAL1} 799-HIS3 dug2Δ::TRP1-UAS_{GAL1}806-URA3-natMX</i>
FY3046 (2.0)	<i>MATa his3Δ200 ura3Δ0 leu2Δ0 trp1Δ63 lys2-128δ sin4Δ0::LEU2 bph1Δ::kanMX-UAS_{GAL1} 799-HIS3 dug2Δ::TRP1-UAS_{GAL1}806-URA3-natMX</i>
FY3047 (1.0)	<i>MATα his3Δ200 ura3Δ0 leu2Δ0 trp1Δ63 lys2-128δ sin4Δ0::LEU2 bph1Δ::kanMX-UAS_{GAL1} 799-HIS3 dug2Δ::TRP1-UAS_{GAL1}806-URA3-natMX</i>
FY3048 (1.1)	<i>MATα his3Δ200 ura3Δ0 leu2Δ0 trp1Δ63 lys2-128δ sin4Δ0::LEU2 bph1Δ::kanMX-UAS_{GAL1} 799-HIS3 dug2Δ::TRP1-UAS_{GAL1}806-URA3-natMX grr1-1</i>
FY3049 (1.2)	<i>MATα his3Δ200 ura3Δ0 leu2Δ0 trp1Δ63 lys2-128δ sin4Δ0::LEU2 bph1Δ::kanMX-UAS_{GAL1} 799-HIS3 dug2Δ::TRP1-UAS_{GAL1}806-URA3-natMX mot3-1 grr1-1 sgm1-1 rim8-1 tma108-1 sgf73-1</i>
FY3050 (2.1)	<i>MATa his3Δ200 ura3Δ0 leu2Δ0 trp1Δ63 lys2-128δ sin4Δ0::LEU2 bph1Δ::kanMX-UAS_{GAL1} 799-HIS3 dug2Δ::TRP1-UAS_{GAL1}806-URA3-natMX yor019w-1</i>
FY3051 (2.2)	<i>MATa his3Δ200 ura3Δ0 leu2Δ0 trp1Δ63 lys2-128δ sin4Δ0::LEU2 bph1Δ::kanMX-UAS_{GAL1} 799-HIS3 dug2Δ::TRP1-UAS_{GAL1}806-URA3-natMX ptr3-1 yor019w-1</i>
FY3052 (2.3a)	<i>MATa his3Δ200 ura3Δ0 leu2Δ0 trp1Δ63 lys2-128δ sin4Δ0::LEU2 bph1Δ::kanMX-UAS_{GAL1} 799-HIS3 dug2Δ::TRP1-UAS_{GAL1}806-URA3-natMX mit1-1 ptr3-1 yor019w-1</i>
FY3053 (2.3b)	<i>MATa his3Δ200 ura3Δ0 leu2Δ0 trp1Δ63 lys2-128δ sin4Δ0::LEU2 bph1Δ::kanMX-UAS_{GAL1} 799-HIS3 dug2Δ::TRP1-UAS_{GAL1}806-URA3-natMX msn2-1 ptr3-1</i>

yor019w-1

- FY3054 *MATa his3Δ200 ura3Δ0 leu2Δ0 lys2-128δ bph1Δ::kanMX-UAS_{GAL1} 799-HIS3
dug2Δ::TRP1-UAS_{GAL1}806*
- FY3055 *MATa his3Δ200 ura3Δ0 leu2Δ0 trp1Δ63 lys2-128δ sin4Δ0::LEU2 bph1Δ::kanMX-
UAS_{GAL1} 799-HIS3 dug2Δ::TRP1-UAS_{GAL1}806-URA3*
- FY3056 *MATα his3Δ200 ura3Δ0 leu2Δ0 trp1Δ63 lys2-128δ sin4Δ0::LEU2 bph1Δ::kanMX-
UAS_{GAL1} 799-HIS3 dug2Δ::TRP1-UAS_{GAL1}806 mot3-1 grr1-1 sgm1-1 rim8-1 tma108-
1 sgf73-1*
- FY3057 *MATa his3Δ200 ura3Δ0 leu2Δ0 trp1Δ63 lys2-128δ sin4Δ0::LEU2 bph1Δ::kanMX-
UAS_{GAL1} 799-HIS3 dug2Δ::TRP1-UAS_{GAL1}806 mit1-1 ptr3-1 yor019w-1*
- FY3058 *MATa his3Δ200 ura3Δ0 leu2Δ0 trp1Δ63 lys2-128δ sin4Δ0::LEU2 bph1Δ::kanMX-
UAS_{GAL1} 799-HIS3 dug2Δ::TRP1-UAS_{GAL1}806 msn2-1 ptr3-1 yor019w-1*
- FY3059 *MATa his3Δ200 ura3Δ0 leu2Δ0 trp1Δ63 lys2-128δ sin4Δ0::LEU2 bph1Δ::kanMX-
UAS_{GAL1} 799-HIS3 dug2Δ::TRP1-UAS_{GAL1}806 mot3- 1*
- FY3060 *MATa his3Δ200 ura3Δ0 leu2Δ0 trp1Δ63 lys2-128δ sin4Δ0::LEU2 bph1Δ::kanMX-
UAS_{GAL1} 799-HIS3 dug2Δ::TRP1-UAS_{GAL1}806 grr1-531*
- FY3061 *MATα his3Δ200 ura3Δ0 leu2Δ0 trp1Δ63 lys2-128δ sin4Δ0::LEU2 bph1Δ::kanMX-
UAS_{GAL1} 799-HIS3 dug2Δ::TRP1-UAS_{GAL1}806 mot3-1 grr1-1*
- FY3062 *MATα his3Δ200 ura3Δ0 leu2Δ0 trp1Δ63 lys2-128δ bph1Δ::kanMX-UAS_{GAL1} 799-
HIS3 dug2Δ::TRP1-UAS_{GAL1}806 mot3-1 grr1-1*
- FY3063 *MATα his3Δ200 ura3Δ0 leu2Δ0 trp1Δ63 lys2-128δ sin4Δ0::LEU2 bph1Δ::kanMX-
UAS_{GAL1} 799-HIS3 dug2Δ::TRP1-UAS_{GAL1}806 mot3-1 msn2-1*
- FY3064 *MATa his3Δ200 ura3Δ0 leu2Δ0 trp1Δ63 lys2-128δ sin4Δ0::LEU2 bph1Δ::kanMX-
UAS_{GAL1} 799-HIS3 dug2Δ::TRP1-UAS_{GAL1}806 msn2-1 sin4Δ0*

FY3065 *MAT α his3 Δ 200 ura3 Δ 0 leu2 Δ 0 trp1 Δ 63 lys2-128 δ sin4 Δ 0::LEU2 bph1 Δ ::kanMX-UASGAL1 799-HIS3 dug2 Δ ::TRP1-UASGAL1806 mit1-1 msn2-1*

FY3066 *MATa his3 Δ 200 ura3 Δ 0 leu2 Δ 0 trp1 Δ 63 lys2-128 δ sin4 Δ 0::LEU2 bph1 Δ ::kanMX-UASGAL1 799-HIS3 dug2 Δ ::TRP1-UASGAL1806 mit1-1 sin4 Δ 0*

FY3067 *MAT α his3 Δ 200 ura3 Δ 0 leu2 Δ 0 trp1 Δ 63 lys2-128 δ sin4 Δ 0::LEU2 bph1 Δ ::kanMX-UASGAL1 799-HIS3 dug2 Δ ::TRP1-UASGAL1806 mot3-1 mit1-1*

FY3068 *MAT α his3 Δ 200 ura3 Δ 0 leu2 Δ 0 trp1 Δ 63 lys2-128 δ sin4 Δ 0::LEU2 bph1 Δ ::kanMX-UASGAL1 799-HIS3 dug2 Δ ::TRP1-UASGAL1806 mot3-1 mit1-1 msn2-1*

FY3069 *MATa his3 Δ 200 ura3 Δ 0 leu2 Δ 0 trp1 Δ 63 lys2-128 δ sin4 Δ 0::LEU2 bph1 Δ ::kanMX-UAS_{GAL1} 799-HIS3 dug2 Δ ::TRP1-UAS_{GAL1}806 MIT1 ptr3-1 yor019w-1*

FY3070 *MATa his3 Δ 200 ura3 Δ 0 leu2 Δ 0 trp1 Δ 63 lys2-128 δ sin4 Δ 0::LEU2 bph1 Δ ::kanMX-UAS_{GAL1} 799-HIS3 dug2 Δ ::TRP1-UAS_{GAL1}806 mit1-1 PTR3 yor019w-1*

FY3071 *MATa his3 Δ 200 ura3 Δ 0 leu2 Δ 0 trp1 Δ 63 lys2-128 δ sin4 Δ 0::LEU2 bph1 Δ ::kanMX-UAS_{GAL1} 799-HIS3 dug2 Δ ::TRP1-UAS_{GAL1}806 mit1-1 ptr3-1 YOR019W*

FY3072 *MATa his3 Δ 200 ura3 Δ 0 leu2 Δ 0 trp1 Δ 63 lys2-128 δ sin4 Δ 0::LEU2 bph1 Δ ::kanMX-UAS_{GAL1} 799-HIS3 dug2 Δ ::TRP1-UAS_{GAL1}806 MSN2 ptr3-1 yor019w-1*

FY3073 *MATa his3 Δ 200 ura3 Δ 0 leu2 Δ 0 trp1 Δ 63 lys2-128 δ sin4 Δ 0::LEU2 bph1 Δ ::kanMX-UAS_{GAL1} 799-HIS3 dug2 Δ ::TRP1-UAS_{GAL1}806 msn2-1 PTR3 yor019w-1*

FY3074 *MATa his3 Δ 200 ura3 Δ 0 leu2 Δ 0 trp1 Δ 63 lys2-128 δ sin4 Δ 0::LEU2 bph1 Δ ::kanMX-UAS_{GAL1} 799-HIS3 dug2 Δ ::TRP1-UAS_{GAL1}806 msn2-1 ptr3-1 YOR019W*

FY3075 *MAT α his3 Δ 200 ura3 Δ 0 leu2 Δ 0 trp1 Δ 63 lys2-128 δ sin4 Δ 0::LEU2 bph1 Δ ::kanMX-UAS_{GAL1} 799-HIS3 dug2 Δ ::TRP1-UAS_{GAL1}806 mot3 Δ 0::URA3 grr1-1*

FY3076 *MAT α his3 Δ 200 ura3 Δ 0 leu2 Δ 0 trp1 Δ 63 lys2-128 δ sin4 Δ 0::LEU2 bph1 Δ ::kanMX-UAS_{GAL1} 799-HIS3 dug2 Δ ::TRP1-UAS_{GAL1}806 mot3-1 grr1 Δ 0::URA3*

FY3077 *MATa his3Δ200 ura3Δ0 leu2Δ0 trp1Δ63 lys2-128δ sin4Δ0::LEU2 bph1Δ::kanMX-UAS_{GAL1} 799-HIS3 dug2Δ::TRP1-UAS_{GAL1}806 mit1Δ0::URA3 ptr3-1 yor019w-1*

FY3078 *MATa his3Δ200 ura3Δ0 leu2Δ0 trp1Δ63 lys2-128δ sin4Δ0::LEU2 bph1Δ::kanMX-UAS_{GAL1} 799-HIS3 dug2Δ::TRP1-UAS_{GAL1}806 mit1-1 ptr3Δ0::URA3 yor019w-1*

FY3079 *MATa his3Δ200 ura3Δ0 leu2Δ0 trp1Δ63 lys2-128δ sin4Δ0::LEU2 bph1Δ::kanMX-UAS_{GAL1} 799-HIS3 dug2Δ::TRP1-UAS_{GAL1}806 msn2Δ0::URA3 ptr3-1 yor019w-1*

FY3080 *MATa his3Δ200 ura3Δ0 leu2Δ0 trp1Δ63 lys2-128δ sin4Δ0::LEU2 bph1Δ::kanMX-UAS_{GAL1} 799-HIS3 dug2Δ::TRP1-UAS_{GAL1}806 msn2-1 ptr3-Δ0::URA3 yor019w-1*

FY3081 *MATa his3Δ200 ura3Δ0 leu2Δ0 lys2-128δ bph1Δ::kanMX-UAS_{GAL1}280-HIS3 dug2Δ::TRP1-UAS_{GAL1}806*

FY3082 *MATa his3Δ200 ura3Δ0 leu2Δ0 lys2-128δ bph1Δ::kanMX-UAS_{GAL1}1397-HIS3 dug2Δ::TRP1-UAS_{GAL1}806*

FY3083 *MATa his3Δ200 ura3Δ0 leu2Δ0 lys2-128δ bph1Δ::kanMX-UAS_{GAL1}2027-HIS3 dug2Δ::TRP1-UAS_{GAL1}806*

FY3084 *MATa his3Δ200 ura3Δ0 leu2Δ0 trp1Δ63 lys2-128δ sin4Δ0::LEU2 bph1Δ::kanMX-UAS_{GAL1}280-HIS3 dug2Δ::TRP1-UAS_{GAL1}806-URA3*

FY3085 *MATa his3Δ200 ura3Δ0 leu2Δ0 trp1Δ63 lys2-128δ sin4Δ0::LEU2 bph1Δ::kanMX-UAS_{GAL1}1397-HIS3 dug2Δ::TRP1-UAS_{GAL1}806-URA3*

FY3086 *MATa his3Δ200 ura3Δ0 leu2Δ0 trp1Δ63 lys2-128δ sin4Δ0::LEU2 bph1Δ::kanMX-UAS_{GAL1}2027-HIS3 dug2 Δ::TRP1-UAS_{GAL1}806-URA3*

FY3087 *MATα his3Δ200 ura3Δ0 leu2Δ0 trp1Δ63 lys2-128δ sin4Δ0::LEU2 bph1Δ::kanMX-UAS_{GAL1}280-HIS3 dug2Δ::TRP1-UAS_{GAL1}806 mot3-1 grr1-1*

FY3088 *MATα his3Δ200 ura3Δ0 leu2Δ0 trp1Δ63 lys2-128δ sin4Δ0::LEU2 bph1Δ::kanMX-UAS_{GAL1}1397-HIS3 dug2Δ::TRP1-UAS_{GAL1}806 mot3-1 grr1-1*

FY3089 *MAT α his3 Δ 200 ura3 Δ 0 leu2 Δ 0 trp1 Δ 63 lys2-128 δ sin4 Δ 0::LEU2 bph1 Δ ::kanMX-UAS_{GAL1}2027-HIS3 dug2 Δ ::TRP1-UAS_{GAL1}806 mot3-1 grr1-1*

FY3090 *MAT α his3 Δ 200 ura3 Δ 0 leu2 Δ 0 trp1 Δ 63 lys2-128 δ sin4 Δ 0::LEU2 bph1 Δ ::kanMX-UAS_{GAL1}280-HIS3 dug2 Δ ::TRP1-UAS_{GAL1}806 mit1-1 ptr3-1 yor019w-1*

FY3091 *MAT α his3 Δ 200 ura3 Δ 0 leu2 Δ 0 trp1 Δ 63 lys2-128 δ sin4 Δ 0::LEU2 bph1 Δ ::kanMX-UAS_{GAL1}1397-HIS3 dug2 Δ ::TRP1-UAS_{GAL1}806 mit1-1 ptr3-1 yor019w-1*

FY3092 *MAT α his3 Δ 200 ura3 Δ 0 leu2 Δ 0 trp1 Δ 63 lys2-128 δ sin4 Δ 0::LEU2 bph1 Δ ::kanMX-UAS_{GAL1}2027-HIS3 dug2 Δ ::TRP1-UAS_{GAL1}806 mit1-1 ptr3-1 yor019w-1*

FY3093 *MAT α his3 Δ 200 ura3 Δ 0 leu2 Δ 0 trp1 Δ 63 lys2-128 δ sin4 Δ 0::LEU2 bph1 Δ ::kanMX-UAS_{GAL1}280-HIS3 dug2 Δ ::TRP1-UAS_{GAL1}806 msn2-1 ptr3-1 yor019w-1*

FY3094 *MAT α his3 Δ 200 ura3 Δ 0 leu2 Δ 0 trp1 Δ 63 lys2-128 δ sin4 Δ 0::LEU2 bph1 Δ ::kanMX-UAS_{GAL1}1397-HIS3 dug2 Δ ::TRP1-UAS_{GAL1}806 msn2-1 ptr3-1 yor019w-1*

FY3095 *MAT α his3 Δ 200 ura3 Δ 0 leu2 Δ 0 trp1 Δ 63 lys2-128 δ sin4 Δ 0::LEU2 bph1 Δ ::kanMX-UAS_{GAL1}2027-HIS3 dug2 Δ ::TRP1-UAS_{GAL1}806 msn2-1 ptr3-1 yor019w-1*

FY3096 *MAT α his3 Δ 200 ura3 Δ 0 leu2 Δ 0 lys2-128 δ bph1 Δ ::kanMX-UAS_{GAL1} 799-HIS3 dug2 Δ ::TRP1-UAS_{GAL1}806 UAS_{GAL1}-10 Δ ::hphMX*

FY3097 *MAT α his3 Δ 200 ura3 Δ 0 leu2 Δ 0 lys2-128 δ bph1 Δ ::kanMX-UAS_{GAL1} 799-HIS3 dug2 Δ ::TRP1-UAS_{GAL1}806 UAS_{GAL1}-10 Δ ::hphMX MED3-FLAG::natMX*

FY3098 *MAT α his3 Δ 200 ura3 Δ 0 leu2 Δ 0 lys2-128 δ bph1 Δ ::kanMX-UAS_{GAL1} 799-HIS3 dug2 Δ ::TRP1-UAS_{GAL1}806 UAS_{GAL1}-10 Δ ::hphMX sin4 Δ 0::LEU2*

FY3099 *MAT α his3 Δ 200 ura3 Δ 0 leu2 Δ 0 lys2-128 δ bph1 Δ ::kanMX-UAS_{GAL1} 799-HIS3 dug2 Δ ::TRP1-UAS_{GAL1}806 UAS_{GAL1}-10 Δ ::hphMX sin4 Δ 0::LEU2 MED3-FLAG::NatMX*

FY3100 *MAT α his3 Δ 200 ura3 Δ 0 leu2 Δ 0 lys2-128 δ bph1 Δ ::kanMX-UAS_{GAL1} 799-HIS3*

dug2Δ::TRP1-UAS_{GAL1}806 UAS_{GAL1}-10Δ::hphMX sin4Δ0::LEU2 mot3-1 grr1-1
 FY3101 *MATa his3Δ200 ura3Δ0 leu2Δ0 lys2-128δ bph1Δ::kanMX-UAS_{GAL1}799 dug2*
Δ::TRP1-UAS_{GAL1}806 UAS_{GAL1}-10Δ::hphMX sin4Δ0::LEU2 mot3-1 grr1-1 MED3-
FLAG::NatMX
 FY3102 *MATα his3Δ200 ura3Δ0 leu2Δ0 trp1Δ63 lys2-128δ sin4Δ0::LEU2 bph1Δ::kanMX-*
UAS_{GAL1} 799-HIS3 dug2Δ::TRP1-UAS_{GAL1}806 MOT3 grr1-1 sgm1-1 rim8-1 tma108-
1 sgf73-1
 FY3103 *MATα his3Δ200 ura3Δ0 leu2Δ0 trp1Δ63 lys2-128δ sin4Δ0::LEU2 bph1Δ::kanMX-*
UAS_{GAL1}799-HIS3 dug2Δ::TRP1-UAS_{GAL1}806 mot3-1 GRR1 sgm1-1 rim8-1 tma108-
1 sgf73-1
 FY3104 *MATα his3Δ200 ura3Δ0 leu2Δ0 trp1Δ63 lys2-128δ sin4Δ0::LEU2 bph1Δ::kanMX-*
UAS_{GAL1} 799-HIS3 dug2Δ::TRP1-UAS_{GAL1}806 mot3-1 grr1-1 SGM1 rim8-1 tma108-
1 sgf73-1
 FY3105 *MATα his3Δ200 ura3Δ0 leu2Δ0 trp1Δ63 lys2-128δ sin4Δ0::LEU2 bph1Δ::kanMX-*
UAS_{GAL1}799 dug2Δ::TRP1-UAS_{GAL1}806-URA3 ptr3-1
 FY3106 *MATa his3Δ200 ura3Δ0 leu2Δ0 trp1Δ63 lys2-128δ sin4Δ0::LEU2 bph1Δ::kanMX-*
UAS_{GAL1} 799-HIS3 dug2Δ::TRP1-UAS_{GAL1}806-URA3 yor019w-1-1
 FY3107 *MATα his3Δ200 ura3Δ0 leu2Δ0 trp1Δ63 lys2-128δ sin4Δ0::LEU2 bph1Δ::kanMX-*
UAS_{GAL1}799 dug2Δ::TRP1-UAS_{GAL1}806-URA3 ptr3-1 yor019w-1
 FY3108 *MATα his3Δ200 ura3Δ0 leu2Δ0 trp1Δ63 lys2-128δ sin4Δ0::LEU2 bph1Δ::kanMX-*
UAS_{GAL1} 799-HIS3 dug2Δ::TRP1-UAS_{GAL1}806-URA3 mit1-1 ptr3-1 yor019w-1
 FY3109 *MATα his3Δ200 ura3Δ0 leu2Δ0 trp1Δ63 lys2-128δ sin4Δ0::LEU2 bph1Δ::kanMX-*
UAS_{GAL1} 799-HIS3 dug2Δ::TRP1-UAS_{GAL1}806-URA3 msn2-1 ptr3-1 yor019w-1
 FY2650 *MATa his3Δ200 lys2-128d leu2Δ0 ura3Δ0 trp1Δ63 sin4Δ0::LEU2 med3Δ0::LEU2*

bph1Δ::kanMX-UAS_{GAL1}799-HIS3

FY2651 *MATa ade8-140 his3Δ200 lys2-128d leu2Δ0 ura3Δ0 trp1Δ63 sin4Δ0::LEU2*

med2Δ0::URA3 bph1Δ::kanMX-UAS_{GAL1}799-HIS3

FY2657 *MATα ade8-140 his3Δ200 lys2-128d leu2Δ0 ura3Δ0 trp1Δ63 sin4Δ0::LEU2*

cdk8Δ0::URA3 bph1Δ::kanMX-UAS_{GAL1}799-HIS3

Strains isolated during the mutant isolation are indicated by additional numbers in parentheses which indicate the stage when they were isolated. Lineage 1 has strains 1.0, 1.1, and 1.2, and lineage 2 has strains 2.0, 2.1, 2.2, 2.3a, and 2.3b.