

### Supporting Table S1: Yeast strains

Most experiments were performed with multiple isolates of a given genotype, as listed below. The genotype of all BR1919 strains is *leu2-3,122 his4-260 ura3-1 ade2-1 thr1-4 lys2 trp1-289*, plus additional features listed below. BR1919 diploids are fully homozygous at all loci except *MAT*. S96 and YJM789 haploid parents used to generate hybrids for recombination mapping are listed below.

The genotype of all S96 strains is *MATa ho lys5*, plus additional features as listed.

The genotype of all YJM789 strains is *MATa ho::hisG lys2 cyh*, plus additional features as listed.

Strain names	Strain number(s)	Strain background	Relevant genotype
wt S96	JCF1100	S96	
wt YJM789	JCF4411	YJM789	
<i>tel1Δ</i> S96	yCA694, 695	S96	<i>tel1Δ::KAN</i>
<i>tel1Δ</i> YJM789	yCA703, 704	YJM789	<i>tel1Δ::KAN</i>
<i>sgs1Δ</i> S96	SYC1120, yCA1318, 1319, 1320	S96	<i>sgs1Δ::KAN</i> (SYC1120), <i>sgs1Δ::NAT</i> (yCA1318, 1319, 1320)
<i>sgs1Δ</i> YJM789	SYC1121, YCA1321, 1322, 1323	YJM789	<i>sgs1Δ::KAN</i> (SYC1121), <i>sgs1Δ::NAT</i> (yCA1321, 1322, 1323)
<i>zip3Δ</i> S96	yCA223, 224, 225	S96	<i>zip3Δ::KAN</i>
<i>zip3Δ</i> YJM789	yCA291, 292, 293	YJM789	<i>zip3Δ::KAN</i>
<i>msh4Δ</i> S96	SYC1110	S96	<i>msh4Δ::KAN</i>
<i>msh4Δ</i> YJM789	SYC1111	YJM789	<i>msh4Δ::KAN</i>
<i>zip3Δ tel1Δ</i> S96	yCA1126, 1127	S96	<i>zip3Δ::KAN</i> <i>tel1Δ::NAT</i>
<i>zip3Δ tel1Δ</i> YJM789	yCA1085, 1086	YJM789	<i>zip3Δ::KAN</i> <i>tel1Δ::NAT</i>
<i>zip3Δ sgs1Δ</i> S96	yCA1130, 1131	S96	<i>zip3Δ::KAN</i> <i>sgs1Δ::NAT</i>
<i>zip3Δ sgs1Δ</i> YJM789	yCA1083, 1084	YJM789	<i>zip3Δ::KAN</i> <i>sgs1Δ::NAT</i>
wt (chr IV labeled at position 1242816)	yCA1442, 1444	BR1919	<i>MATa/α leu2::tetR-mCherry-HYG/leu2::tetR-mCherry-HYG chrIV-R::tetOarray-URA3/chrIV-R::tetOarray-URA3 Zip3-GFP::KAN/Zip3-GFP::KAN</i>
<i>tel1Δ</i> (chr IV labeled at position 1242816)	yCA1443, 1445	BR1919	<i>MATa/α leu2::tetR-mCherry-HYG/leu2::tetR-mCherry-HYG chrIV-R::tetOarray-URA3/chrIV-R::tetOarray-URA3 Zip3-GFP::KAN/Zip3-GFP::KAN tel1Δ::NAT/tel1Δ::NAT</i>
wt (chr XIV labeled at position 743894)	yCA1076	BR1919	<i>MATa/α leu2::tetR-mCherry-HYG/leu2::tetR-mCherry-HYG chrXIV-R::tetOarray-THR1/chrXIV-R::tetOarray-THR1 Zip3-GFP::KAN/Zip3-GFP::KAN</i>
<i>tel1Δ</i> (chr XIV labeled at position 743894)	yCA1077	BR1919	<i>MATa/α leu2::tetR-mCherry-HYG/leu2::tetR-mCherry-HYG chrXIV-R::tetOarray-THR1/chrXIV-R::tetOarray-THR1 Zip3-GFP::KAN/Zip3-GFP::KAN tel1Δ::NAT/tel1Δ::NAT</i>

Strain names	Strain number(s)	Strain background	Relevant genotype
<i>zip1</i> Δ	yCA1264	BR1919	<i>MATa/α zip1Δ::LYS2/zip1Δ::LYS2</i>
<i>zip1</i> Δ <i>sgs1</i> Δ	yCA1260	BR1919	<i>MATa/α zip1Δ::LYS2/zip1Δ::LYS2 sgs1Δ::KAN/sgs1Δ::KAN</i>
<i>zip1</i> Δ <i>tel1</i> Δ	yCA1262	BR1919	<i>MATa/α zip1Δ::LYS2/zip1Δ::LYS2 tel1Δ::NAT/tel1Δ::NAT</i>