

## **Description of Additional Supplementary Files**

**Supplementary Data 1:** Strains used in this study

**Supplementary Data 2:** Telomere length, ITS content and Y' copy number estimations from short read sequencing data

**Supplementary Data 3:** Telomere and ITS annotations from long read-derived genome assemblies

**Supplementary Data 4:** Y' and X elements annotations from long read-derived genome assemblies

**Supplementary Data 5:** growth phenotypes in liquid medium and number of generations

**Supplementary Data 6:** growth phenotypes in solid medium

**Supplementary Data 7:** viability phenotypes

**Supplementary Data 8:** protein abundance in MAL and AEL (log2FC)

**Supplementary Data 9:** protein abundance changes during MAL and AEL and GO terms enrichments

**Supplementary Data 10:** variants accumulated during MAL and AEL

**Supplementary Data 11:** GO terms enrichment from MAL and AEL

**Supplementary Data 12:** structural variants (SVs) accumulated during MAL and AEL

**Supplementary Data 13:** List of primers, oligos and gRNAs used in this study