The yeast *SUF5* frameshift suppressor encodes a mutant glycine tRNA_{ccc}

Carl B.Ball*, Michael D.Mendenhall⁺, Mark G.Sandbaken and Michael R.Culbertson

Laboratories of Genetics and Molecular Biology, University of Wisconsin, Madison, WI 53706, USA

Submitted July 29, 1988

Accession no. X12364

The *SUF5* gene of *Saccharomyces cerevisiae* (1) was cloned by its ability to suppress the *his4-519* frameshift mutation. The DNA sequences of mutant and wild type alleles were determined (the sequence of the wild type gene is shown). Part of a delta element, a dispersed repeated sequence (2), extends from nucleotides 1 to 231. The region from base 319 to 389 can be folded into the cloverleaf pattern typically found for tRNAs. The predicted anticodon, 5'-CCC-3', indicates that this tRNA translates glycine codons. The *SUF5-1* allele has one additional cytidine inserted between bases 352 and 355 resulting in a 5'-CCCC-3' four base anticodon. Another frameshift-suppressing allele, *SUF5-4*, which has a suppression spectrum differing from that of *SUF5-1*, has an additional cytidine inserted between bases 350 and 351. The insertion in *SUF5-4* enlarges the anticodon loop and results in a putative 5'-UCCC-3' anticodon. RPC-5 column chromatography of glycine tRNAs from mutant and wild type strains provided evidence that *suf5* encoded a unique species of tRNA (1). A haploid strain deleted for the genomic copy of *suf5* alone or in combination with a deletion of the related *suf3* gene (see accompanying paper) had no obvious phenotypic effects, however.

```

1-50  ATAGGAGTCCTCAAAAAGGAATCTATATTTCTACATAATAACTATGAT
51-100 TATTTCTCCTTCTGTTCTATATGTTTTATTATCCTATTACGTTATCAATC
101-150 CTTGCATTTTCAGCTTCGTCTAACTTCGATGACAGTTTCTCATATCTTATG
151-200 TCATCGTCTAACACCGTGTATGATAATATATTGGTAGTGTGACTACTAGT
201-250 TGTTAGACGATAGTTGATTTTAATTCCAACACTTACCTATTTATCAGTGT
251-300 CATTACTAAGAAGGAAATTTTTCATTAATAGTATATAACGTGCTGAGTCT
301-350 TCCCAAATTGATTGAAACGCGCAAGTGTTTCAGTGTTAGAATTTATGCT
351-400 TCCCAAGCATGAGGCCGGGTTTCGATTCCCGGCTTGCGCATCTGTTTTTG
401-450 CAAAACAGACTAGGAAATTCAGACGTTTTGTATTTTTTTTTTCCATTTCA
451-453 ATT

```

Acknowledgements: This research was supported by the College of Agricultural and Life Sciences, University of Wisconsin, Madison, WI and by Public Health Service grant GM26217 from the National Institutes of Health to M.R.C. M.D.M. was a National Science Foundation graduate fellow. M.D.M. and M.G.S. were supported by National Institutes of Health training grant GM07215 in Molecular and Cellular Biology.

Present addresses: *Miller Brewing Company, Research Division, Milwaukee, WI 53208 and ⁺Department of Molecular Biology, Research Institute of Scripps Clinic, 10666 North Torrey Pines Rd, La Jolla, CA 92037, USA

References

- (1) Culbertson, M.R., Charnas, L., Johnson, M.T. and Fink, G.R. (1977) *Genetics* **86**,745-764
- (2) Elder, R.T., Loh, E.Y., and Davis, R.W. (1979) *PNAS* **80**,2432-2436