

Nucleotide sequence of two tRNA^{Arg}-tRNA^{Asp} tandem genes linked to duplicated *UBC* genes in *Saccharomyces cerevisiae*

Wolfgang Seufert and Stefan Jentsch

Friedrich-Miescher-Labor der Max-Planck-Gesellschaft, Spemannstrasse 37 – 39, D-7400 Tübingen, FRG

Submitted February 8, 1990

EMBL accession nos X51550, X51551

We have recently cloned the yeast genes *UBC4* and *UBC5* which are closely related in sequence and encode virtually identical ubiquitin-conjugating enzymes (1). The chromosomal location of these genes is unlinked, but interestingly, both genes are linked at their 3'-region to tRNA^{Arg}-tRNA^{Asp} tandem genes. In both cases tRNA genes are encoded on the opposite strand relative to *UBC* genes. The similarity of this gene arrangement might reflect a joint duplication of *UBC* and tRNA genes or alternatively, a *UBC* gene duplication mediated by repetitive tRNA loci.

Here we present the nucleotide sequences of both tRNA^{Arg}-tRNA^{Asp} tandem genes. The sequences given below exactly join the complementary strand of the published *UBC4* and *UBC5* sequences (1). The nucleotide sequences of tRNA^{Arg} and tRNA^{Asp} genes (underlined) correspond to the known primary structure of tRNA₃^{Arg} (2) and tRNA^{Asp} (3). In *Saccharomyces cerevisiae* tRNA^{Arg}-tRNA^{Asp} tandem genes have been identified previously (4). The sequences of the coding regions and a 10 bp spacer were found to be identical to the tRNA genes reported

here. Further similarities were restricted to nucleotides immediately preceding and following the coding sequences indicating that the tRNA genes described here represent novel copies of tRNA^{Arg}-tRNA^{Asp} tandem genes.

ACKNOWLEDGEMENTS

We thank Ute Ehringer for technical assistance. This work was supported by Deutsche Forschungsgemeinschaft grant Je 134/2–1.

REFERENCES

1. Seufert, W. and Jentsch, S. (1990) *EMBO J.* **9**, 543–550.
2. Keith, G. and Dirheimer, G. (1980) *Biochem. Biophys. Res. Commun.* **92**, 116–119.
3. Gangloff, J., Keith, G., Ebel, J.P. and Dirheimer, G. (1972) *Biochim. Biophys. Acta* **259**, 210–222.
4. Schmidt, O., Mao, J., Ogden, R., Beckmann, J., Sakano, H., Abelson, J. and Söll, D. (1980) *Nature* **287**, 750–752.

```

CAAAAACAAA TGAATTGTC TACAAGAATA ATACTGGAAG CACATCCATC TTTAGAGGAA ACATGTTTTC GTTATTTTCAT AAAACCTTCA ACAAATAGTA 100
GCTCGCGTGG CGTAATGGCA ACGCGTCTGA CTTCTAATCA GAAGATTATG GGTTTCGACCC CGATCGTGAG TGCTTTGTTT CTTCCGTGAT AGTTTAATGG 200
TCAGAATGGG CGCTTGTGCG GTGCCAGATC GGGGTTCAAT TCCCGTTCGC GGAGATTTTT TTGGCTACTC CTGCAGTATT CTTCTGCCTC CTTAGTACAG 300
TGTAATGCTC CTCAGAATTT TTGCCAAACA GAGAACCAGT CATTGATCGT TGATTACATA TACTAGCTAT GCGTTGAACT TCAAAAATTT AAATAGGCTT 400
CACCCAGAA ATGATGTTAA TGACAATAGT AATTAACCTA CAGATAGACT AGAAATGAAA AAGGTACGGT TAACGTTGAC GCTCCCTCGA CAAGTTAGGT 500
CAAATATGAA CCACAACCTGA AATATATGCG GGATATACCC GCTTGTCTGCA TGTAACCTAAG CAAAATTTCT CCATACTGTT CGAGGAAAAA AATGTTTCATG 600
AATCTCCCCT GAATAAATTA AATTAAGGTT TACGATTCTGA GTTGTTTGGA AAAAAAAAAA AGTTCCCTCG TACTGTTGCC AACAATAGTC TTATATCTTA 700
TATCAGTAAA TCTATGTT

```

tRNA^{Arg}-tRNA^{Asp} tandem genes linked to *UBC4*

```

TCATATTAGG CTCATTATGA GAAAAGGTTG GTGAGAAATT TAGCATATTT TAAACAATCA TTTAGCTAGA TGAATCAGAA TGTTTTTCCG ACAAATAGTA 100
GCTCGCGTGG CGTAATGGCA ACGCGTCTGA CTTCTAATCA GAAGATTATG GGTTTCGACCC CCATCGTGAG TGCTTTGTTT CTTCCGTGAT AGTTTAATGG 200
TCAGAATGGG CGCTTGTGCG GTGCCAGATC GGGGTTCAAT TCCCGTTCGC GGAGATTTTT TTTTAATTGA TAGTAGCAGG TACAGGAGAA AGAGTAAATA 300
ATAGAAAGCA AGGTACCTGA TGGGAAT

```

tRNA^{Arg}-tRNA^{Asp} tandem genes linked to *UBC5*