Supporting material

The widespread occurrence of tRNA-derived fragments in *Saccharomyces cerevisiae*

Kamilla Bąkowska-Żywicka[1*], Anna M. Mleczko[1], Marta Kasprzyk[1], Piotr Machtel[1], Marek Żywicki[2], and Tomasz Twardowski[1]

[1]Institute of Bioorganic Chemistry Polish Academy of Sciences, Noskowskiego 12/14, 61-704 Poznan, Poland

[2] Department of Computational Biology, Institute of Molecular Biology and Biotechnology, Faculty of Biology A. Mickiewicz University in Poznan, Umultowska 89, 61-614 Poznan, Poland

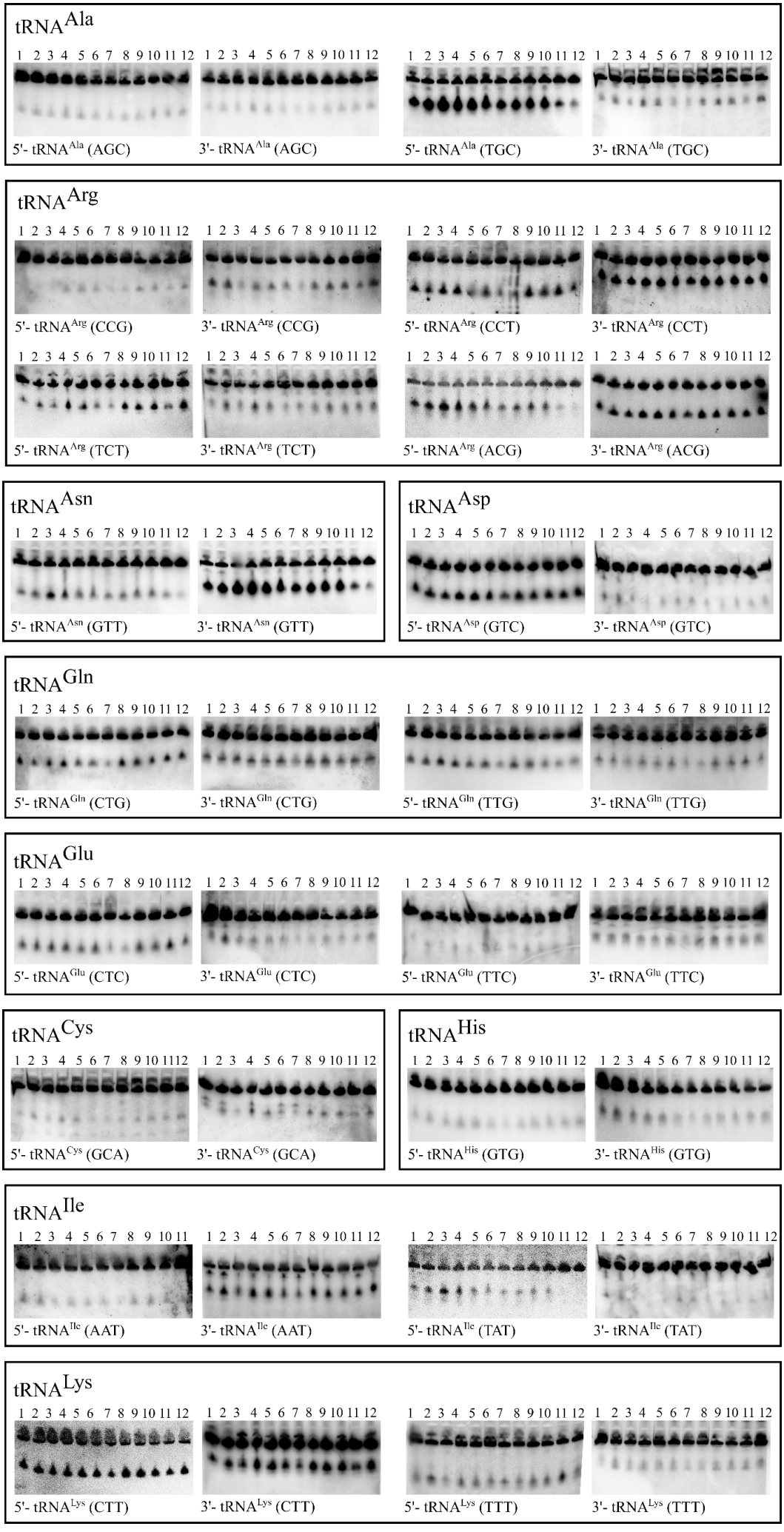
* To whom correspondence should be addressed. Tel: +48/618528503; Fax: +48/6185280532; Email: bakowska@ibch.poznan.pl

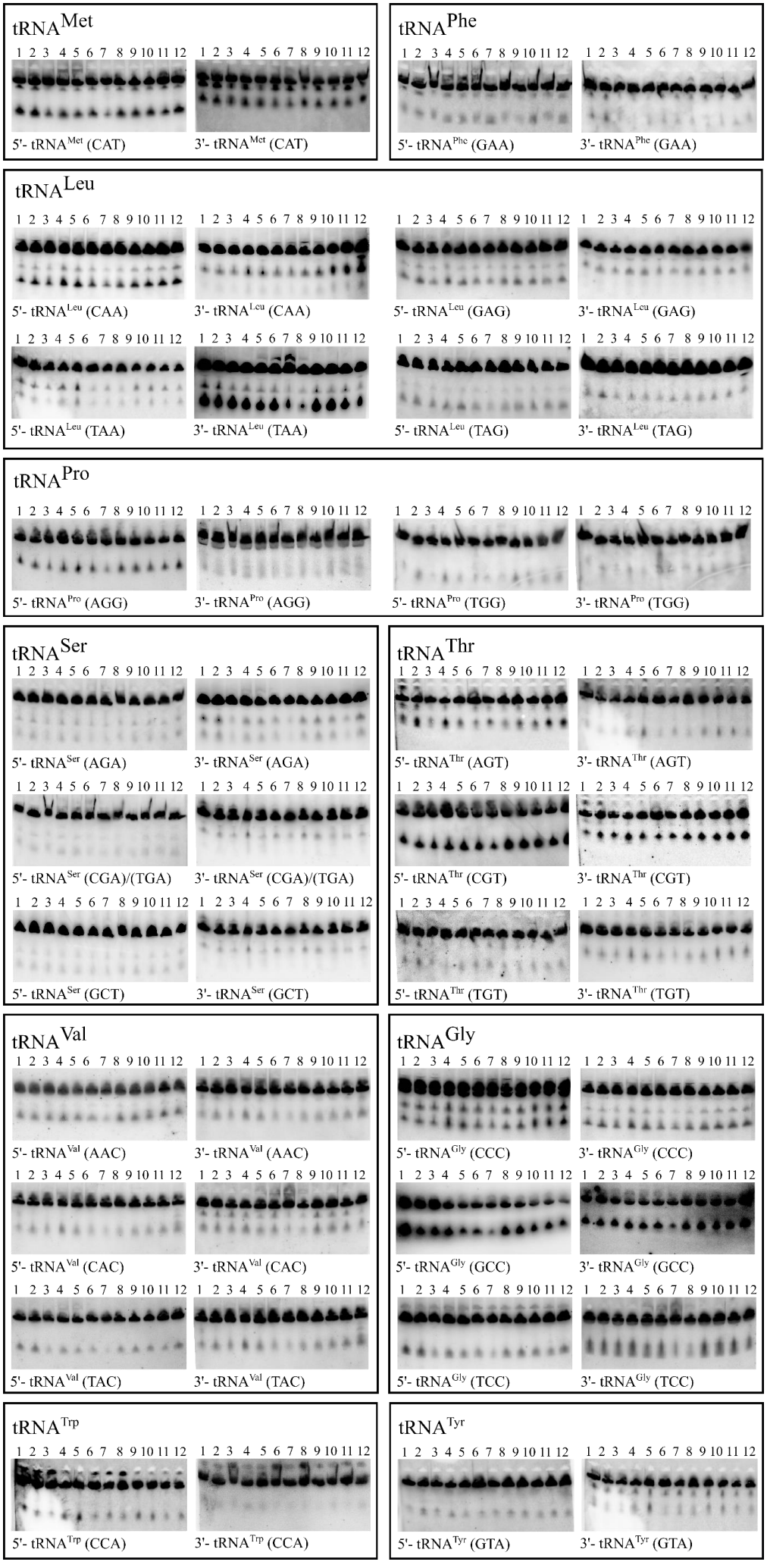
Table S1. Sequences of antisense DNA probes used in this study. Hybridization temperature is indicated (T_H).

tRNA isotype	5'-probe sequence	T_H	3'-probe sequence	T_H
$tRNA^{Ala}$ (AGC)	AGGGAGCGCGCTACCGACTACGCCACACGCCC	55ºC	TTGGACGAGTCCGGAATCGAACCGGAGACC	55ºC
$tRNA^{Ala}$ (TGC)	GGGAAGCGCGCTACCAACTGCGCCATGTGCCC	45ºC	TTGGACGCAACCGGAATCGAACCGATGACC	45ºC
$tRNA^{Arg}$ (ACG)	TGACCATTGGGCCACGAGGA	45ºC	CCCCGCCAGGACTCGAACCTGGAATC	55ºC
$tRNA^{Arg}$ (CCG)	GAATGCATGCTAACCATTGCACTAGAGGAGC	50ºC	TCCTCCCGGGACTCGAACCCGGATC	55ºC
$tRNA^{Arg}$ (CCT)	GGGAGACGCGTTACCATTACGCCAACGGAAC	55ºC	TCCGTACGGGACTCGAACCCGCAGT	50ºC
$tRNA^{Arg}$ (TCT)	GTCAGACGCGTTGCCATTACGCCACGCGAGC	55ºC	CGATGGGGGTCGAACCCATAATCTT	45ºC
$tRNA^{Asn}$ (GTT)	GCACGCCTTAACCAACTTGGCCATGGAGTC	50ºC	CGACCCCAGTGAGGGTTGAACTCACGATCTTGCGAT	45ºC
$tRNA^{Asp}$ (GTC)	GCGCCCATTCTGACCATTAAAC	42ºC	GGCTCCGCGACGGGGAATTGAACCCCG	55ºC
$tRNA^{Cys}$ (GCA)	GCGCTACCACTGCGCCATACGAGC	50ºC	CGCACTCAGGATCGAACTAAGGACC	50ºC
$tRNA^{Gln}$ (CTG)	CCGAAAGTGATAACCACTACACTATAGGAC	50ºC	TCCCACCCGGATTCGAACTGGGG	50ºC
$tRNA^{Gln}$ (TTG)	CCGAAAGTGATAACCACTACACTATAAAAC	42ºC	TCTTACCCGGATTCGAACCGGGG	42ºC
$tRNA^{Glu}$ (CTC)	CGTGATGTGATAGCCGTTACACTACATCGG	50ºC	GGCTCCGAAGCGGGGAGTCGAACCCCGG	55ºC
$tRNA^{Glu}$ (TTC)	CGTGATGTGATAGCCGTTACACTATATCGG	50ºC	GGCTCCGCTACGGGGAGTCGAACCCCGG	55ºC
$tRNA^{Gly}$ (CCC)	AACCACTGAACCACTTTCGC	42ºC	GAAGCCGGGAATCGAAC	42ºC
$tRNA^{Gly}$ (GCC)	TACCACTAAACCACTTGCGC	42ºC	CAAGCCCGGAATCGAAC	42ºC
$tRNA^{Gly}$ (TCC)	AACCACTACACTAACCGCCC	42ºC	GAGCGGTACGAGAATCGAAC	42ºC
$tRNA^{His}$ (GTG)	TGTGTACTAACCACTATACTAAGATGG	45ºC	AGAATCGAACCAGGGTTTCA	60ºC
$tRNA^{Ile}$ (AAT)	GCCTTAACCAACTGGGCCAAGAGACC	50ºC	TGGTCTCTAGCGGGATCG	42ºC
$tRNA^{Ile}$ (TAT)	CGAAGCTCTAACCACTGAGCTACACGAGC	50ºC	ATTGAACCCACGACGGTCGCGT	45ºC
$tRNA^{Leu}$ (CAA)	TGAATCAGGCGCCTTAGACCGCTCGGCC	55ºC	GGTTGCTAAGAGATTCGAACTCTTGCATCT	50ºC
$tRNA^{Leu}$ (GAG)	TCGACCTGACGCCTTAGACCACTCGGCC	55ºC	GATACCCGCGGGGTTTGAACCCGCGCCTCC	55ºC
$tRNA^{Leu}$ (TAA)	TAAGTCTGCCGCCTTAGACCACTCGGCC	55ºC	GAAGGATGCGAGGTTCGAACTCGCGCGGAC	42ºC
$tRNA^{Leu}$ (TAG)	TAAATCTGACGCCTTAAACCACTCGGCC	50ºC	GAGAGCTAAGGGATTCGAACCCTTGCATCC	50ºC
$tRNA^{Lys}$ (CTT)	CGCGCTACCGATTGCGCCAACAAGGC	55ºC	GGCTCGAACCCCTAACCTT	42ºC
$tRNA^{Lys}$ (TTT)	GCCGAACGCTCTACCAACTGAGC	45ºC	CTCCTCATAGGGGGCTCGAACCCC	50ºC
$tRNA^{Met}$ (CAT)	CTGACGCTCTTCCTACTGAGCTACTGAAGC	50ºC	TGCTCCAGGGGAGGTTCGAACTCTCGACCTTCAG	55ºC
$tRNA^{Phe}$ (GAA)	CTCTCCCAACTGAGCTAAATCCG	45ºC	TGCGAATTCTGTGGATCGAACACAGGACC	50ºC
$tRNA^{Pro}$ (AGG)	CGAGAATCATACCTCTAGACCACACGCCC	50ºC	CGAGCCGGGACTCGAACCCGGG	55ºC
$tRNA^{Pro}$ (TGG)	CGAGAATCATACCACTAGACCACACGCCC	50ºC	CGAGCTGGGAATTGAACCCAGG	45ºC
$tRNA^{Ser}$ (AGA)	CGCCTTAACCACTCGGCCAAGTTGCC	50ºC	ACAACTGCAGGACTCGAACC	42ºC
$tRNA^{Ser}$ (CGA)	CGCCTTAACCACTCGGCCATAGTGCC	50ºC	CGACACCAGCAGGATTTGAACCAGCG	50ºC
$tRNA^{Ser}$ (GCT)	CGCCTTAACCACTCGGCCACTGGGAC	55ºC	CGTCACAGACAGGATTCGAACCTGCG	50ºC
$tRNA^{Thr}$ (AGT)	GCCTTACCAACTTGGCCATA	42ºC	TTGAACCGATGATCTCCACA	42ºC
$tRNA^{Thr}$ (CGT)	AGTGCGATGCCTTACCACTTGGCC	45ºC	CTGTGGGAATTGAACCCACGATCCCCGC	55ºC
$tRNA^{Thr}$ (TGT)	ACAAGTGCAACGCTCTACCA	42ºC	GAATTGAACTAACGACCTTTGC	42ºC
$tRNA^{Trp}$ (CCA)	GCTCTACCATTGAGCCACCGCTTC	50ºC	TGAAACGGACAGGAATTGAACC	42ºC
$tRNA^{Tyr}$ (GTA)	GCGCCTTAAACCAACTTGGCTACCGAGAG	50ºC	TCTCCCGGGGGCGAGTCG	45ºC
$tRNA^{Val}$ (AAC)	GCCATAACCGACTAGACCACGAAAC	50ºC	ATTTCGCCCAGGAACGAACTGGGGACG	42ºC
$tRNA^{Val}$ (CAC)	CGTGATAGCCGCTACACTATTGGAAC	50ºC	GTTCCAACCGAGGATCGAACTCGGGACC	50ºC
$tRNA^{Val}$ (TAC)	CTTGAACCACTGGACCATTGGACC	50ºC	GATCCAACCGAGGTTCGAACTCGGGATC	50ºC

Figure S1. tRNA-derived fragments in *Saccharomyces cerevisiae*.

Detection of 3'- and 5'-derived tRNA fragments visualized by northern blot hybridization assays. Numbers correspond to the RNA samples derived from *S. cerevisiae* grown under the following conditions: 1- heat stress, 2 – cold stress, 3 – high salinity, 4 – UV treatment, 5 – anaerobic growth, 6 – optimal conditions, 7 – high pH, 8 – low pH, 9 – amino acid starvation, 10 – sugar starvation, 11- hypoosmotic conditions, 12 – hyperosmotic conditions.


tRNA^Ala
1 2 3 4 5 6 7 8 9 10 11 12
5'- tRNA^Ala (AGC)
3'- tRNA^Ala (AGC)
5'- tRNA^Ala (TGC)
3'- tRNA^Ala (TGC)
tRNA^Arg
5'- tRNA^Arg (CCG)
3'- tRNA^Arg (CCG)
5'- tRNA^Arg (CCT)
3'- tRNA^Arg (CCT)
5'- tRNA^Arg (TCT)
3'- tRNA^Arg (TCT)
5'- tRNA^Arg (ACG)
3'- tRNA^Arg (ACG)
tRNA^Asn
5'- tRNA^Asn (GTT)
3'- tRNA^Asn (GTT)
tRNA^Asp
5'- tRNA^Asp (GTC)
3'- tRNA^Asp (GTC)
tRNA^Gln
5'- tRNA^Gln (CTG)
3'- tRNA^Gln (CTG)
5'- tRNA^Gln (TTG)
3'- tRNA^Gln (TTG)
tRNA^Glu
5'- tRNA^Glu (CTC)
3'- tRNA^Glu (CTC)
5'- tRNA^Glu (TTC)
3'- tRNA^Glu (TTC)
tRNA^Cys
5'- tRNA^Cys (GCA)
3'- tRNA^Cys (GCA)
tRNA^His
5'- tRNA^His (GTG)
3'- tRNA^His (GTG)
tRNA^Ile
5'- tRNA^Ile (AAT)
3'- tRNA^Ile (AAT)
5'- tRNA^Ile (TAT)
3'- tRNA^Ile (TAT)
tRNA^Lys
5'- tRNA^Lys (CTT)
3'- tRNA^Lys (CTT)
5'- tRNA^Lys (TTT)
3'- tRNA^Lys (TTT)


tRNA Met
1 2 3 4 5 6 7 8 9 10 11 12
5'- tRNA Met (CAT)
3'- tRNA Met (CAT)
tRNA Phe
5'- tRNA Phe (GAA)
3'- tRNA Phe (GAA)
tRNA Leu
5'- tRNA Leu (CAA)
3'- tRNA Leu (CAA)
5'- tRNA Leu (GAG)
3'- tRNA Leu (GAG)
5'- tRNA Leu (TAA)
3'- tRNA Leu (TAA)
5'- tRNA Leu (TAG)
3'- tRNA Leu (TAG)
tRNA Pro
5'- tRNA Pro (AGG)
3'- tRNA Pro (AGG)
5'- tRNA Pro (TGG)
3'- tRNA Pro (TGG)
tRNA Ser
5'- tRNA Ser (AGA)
3'- tRNA Ser (AGA)
5'- tRNA Ser (CGA)/(TGA)
3'- tRNA Ser (CGA)/(TGA)
5'- tRNA Ser (GCT)
3'- tRNA Ser (GCT)
tRNA Thr
5'- tRNA Thr (AGT)
3'- tRNA Thr (AGT)
5'- tRNA Thr (CGT)
3'- tRNA Thr (CGT)
5'- tRNA Thr (TGT)
3'- tRNA Thr (TGT)
tRNA Val
5'- tRNA Val (AAC)
3'- tRNA Val (AAC)
5'- tRNA Val (CAC)
3'- tRNA Val (CAC)
5'- tRNA Val (TAC)
3'- tRNA Val (TAC)
tRNA Gly
5'- tRNA Gly (CCC)
3'- tRNA Gly (CCC)
5'- tRNA Gly (GCC)
3'- tRNA Gly (GCC)
5'- tRNA Gly (TCC)
3'- tRNA Gly (TCC)
tRNA Trp
5'- tRNA Trp (CCA)
3'- tRNA Trp (CCA)
tRNA Tyr
5'- tRNA Tyr (GTA)
3'- tRNA Tyr (GTA)