Volume 9 Number 1 1981 Nucleic Acids Research

Collection of published 5S and 5.8S RNA sequences and their precursors

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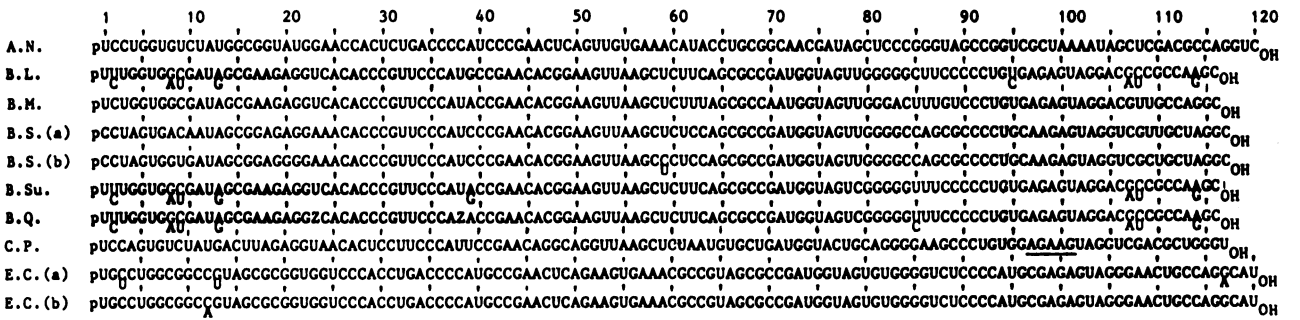
The 1979 collection (1) of mature 5S and 5.8S RNA sequences as well as those of their precursors are updated. This summary does not include those earlier publications in which the oligonucleotide composition, but not the sequences of 5S RNAs has been reported. For this information the reader is referred to reference 2.

The possible structures and functions of prokaryotic 5S and 5.8S RNAs are discussed in two other reviews (3,4).

I would also like to thank those colleagues who have sent me their pre- or reprints on small ribosomal RNA sequences in 1980.

PROKARYOTIC 5S RNA SEQUENCES

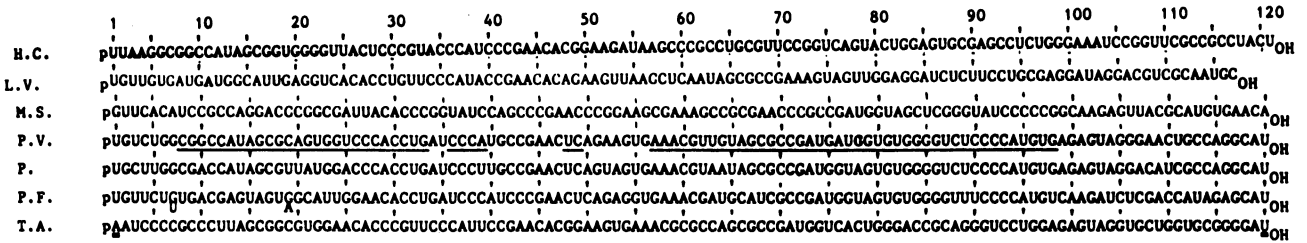


The single underlined sequences are tentative. The double underlined nucleotides occur in less than one mole per mole 5S RNA. Nucleotide written directly under another nucleotide in the sequence indicates that it may also be found in this position. For abbreviation of organisms and literature references see opposite page.

Prokaryotic 5S RNA Sequences

Abbreviation	RNA Source	Reference Number
A.N.	Anacystis Nidulans 1405/1 Katz/Allen (Blue-green Alga)	5
B.L.	Bacillus licheniformis S 244	6, 7, 9
B.M.	Bacillus megaterium KM	8
B.S. (a)	Bacillus stearothermophilus 1439 FV	9
B.S. (b)	Bacillus stearothermophilus (strain not given)	10
B.S. (b)	Bacillus stearothermophilus 799	11
B.Su.	Bacillus subtilis 168	7, 9
B.Q.	Bacillus Q	7
C.P.	Closteridium pasteurianum ATCC 6013	12
E.C. (a)	Escherichia coli MRE600	13 - 17
E.C. (b)	Escherichia coli CA265	13 - 16

PROKARYOTIC 5S RNA SEQUENCES



PROKARYOTIC 5S RNA PRECURSORS

p.B.Q. (A1) pUGAGAGAACACCUCUCAAUGG.....mature 5S RNA.....AAUCAUACGGUCCCAUGCGAUGCUAAAGGCUUUUX OH

p.B.Q. (A2) pUGAGAGAACACCUCUCAAUGG.....mature 5S RNA.....AAUCAUACGUCAAAGACAGAUGCUGAGCUUUUUUC OH

p.B.Q. (A3) pUGAGAGAACACCUCUCAAUGG.....mature 5S RNA.....GAUACUUGACCCAGUUCAUGxxxxxxxxxxxxxxx OH

p.B.Q. (B1) pUGAGAGAACACCUCUCAAUGG.....mature 5S RNA.....UUUUU OH

p.B.Q. (B2) pUGAGAGAACACCUCUCAAUGG.....mature 5S RNA.....CUUUUU OH

p.B.Su. pUGAGAGAACACUCUCAAUUUG.....Mature 5S RNA.....AAGCUUAAACCCAGCUCAAUGAGCUGGGUUUUUUGUUUUUUG OH

p.E.C. pAUU, pUU and pU have been found at the 5' end of E. coli 5S RNA

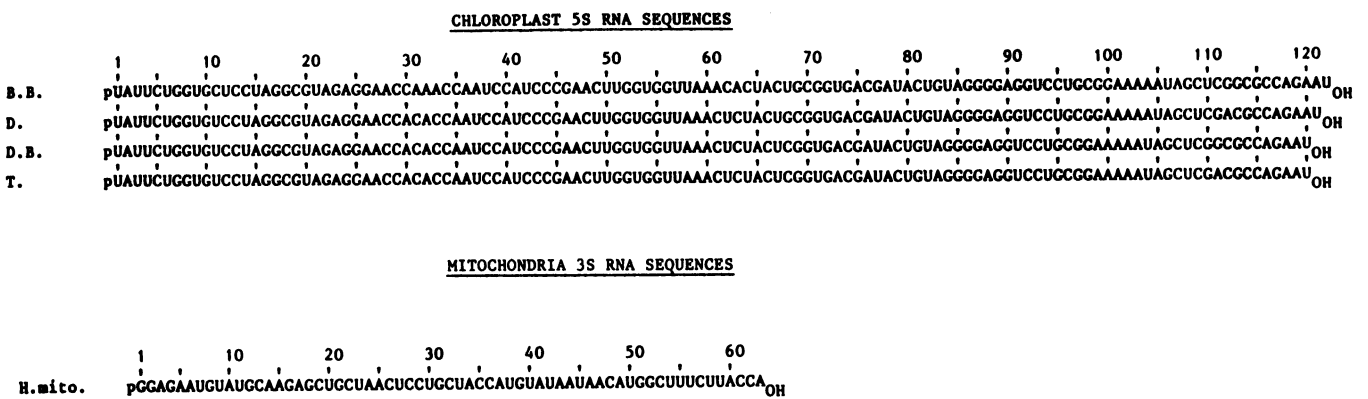
The single underlined sequences are tentative. The double underlined nucleotides occur in less than one mole per mole 5S RNA. Nucleotides written directly under another nucleotide in the sequence indicates that it may also be found in this position. X indicates nucleotide unknown. For abbreviation of organisms and literature reference see opposite page.

Prokaryotic 5S RNA Sequences

Abbreviation	RNA Source	Reference Number
H.C.	*Halobacterium cutirubrum* N.R.C. 34001	18
L.V.	*Lactobacillus vividescens*	19
M.S.	*Mycobacterium smegmatis* SN2	20
P.V.	*Proteus vulgaris* (strain not given)	17
P	*Photobacter* 8265	21
P.F.	*Pseudomonas fluorescens* ATCC 13430	22
T.A.	*Thermus aquaticus* ATCC 25104	23

Prokaryotic 5S RNA Precursors

p.B.Q.(A_1-B_2)	*Bacillus Q*	24
p.B.Su.	*Bacillus subtilis* 168	25, 26
p.E.C.	*Escherichia coli* 217 (sud-1)	27


CHLOROPLAST 5S RNA SEQUENCES
1 10 20 30 40 50 60 70 80 90 100 110 120
B.B. pUAUUCUGGUGCUCCUAGGCGUAGAGGAACCAAACCAAUCCAUCCCGAACUUGGUGGUUAAACACUACUGCGGUGACGAUACUGUAGGGGAGGUCCUGCGGAAAAAUAGCUCGGCGCCAGAAU OH
D. pUAUUCUGGUGUCCUAGGCGUAGAGGAACCACACCAAUCCAUCCCGAACUUGGUGGUUAAACUCUACUGCGGUGACGAUACUGUAGGGGAGGUCCUGCGGAAAAAUAGCUCGACGCCAGAAU OH
D.B. pUAUUCUGGUGUCCUAGGCGUAGAGGAACCACACCAAUCCAUCCCGAACUUGGUGGUUAAACUCUACUCGGUGACGAUACUGUAGGGGAGGUCCUGCGGAAAAAUAGCUCGGCGCCAGAAU OH
T. pUAUUCUGGUGUCCUAGGCGUAGAGGAACCACACCAAUCCAUCCCGAACUUGGUGGUUAAACUCUACUCGGUGACGAUACUGUAGGGGAGGUCCUGCGGAAAAAUAGCUCGACGCCAGAAU OH
MITOCHONDRIA 3S RNA SEQUENCES
1 10 20 30 40 50 60
H.mito. pGGAGAAUGUAUGCAAGAGCUGCUAACUCCUGCUACCAUGUAUAAUAACAUGGCUUUCUUACCA OH

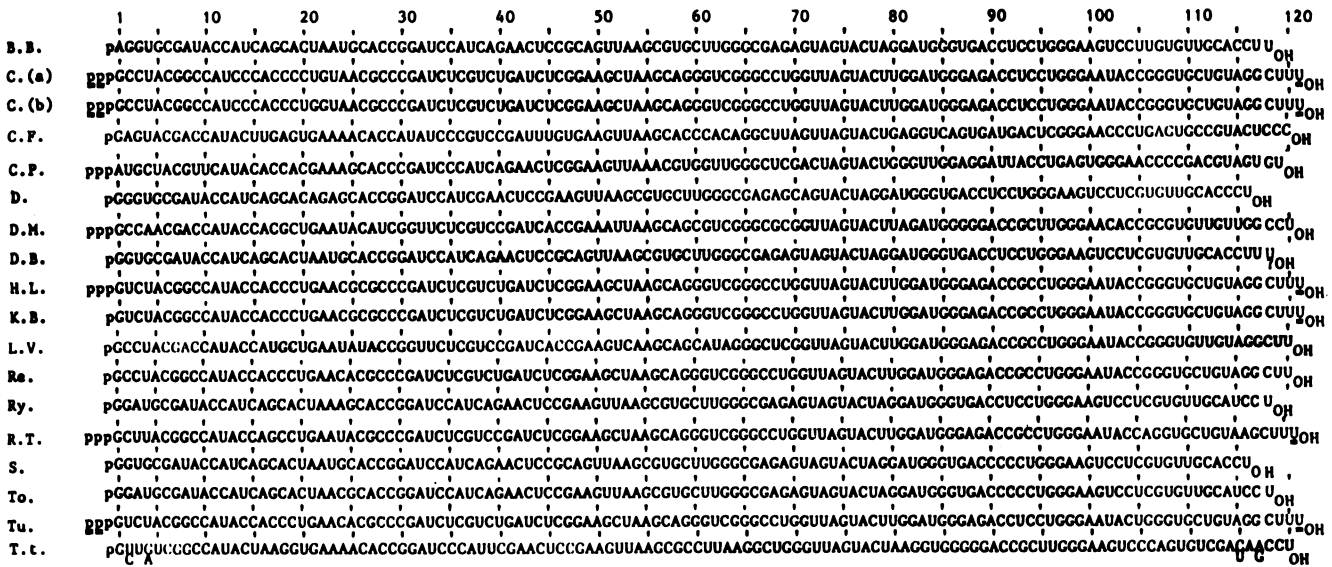
Chloroplast 5S RNA Sequences

Abbreviation		Reference Number
B.B.	Broad bean (*Vicia faba*)	28
D.	Duckweed (*Lemna minor*)	28
D.B.	Dwarf bean (*Phaseolus vulgaris*)	28
T.	Tobacco (*Nicotiana tabacum*)	28

Mitochondria 3S RNA Sequences

H. mito.	Hamster (BHK-21) cells	29

EUKARYOTIC 5S RNA SEQUENCES

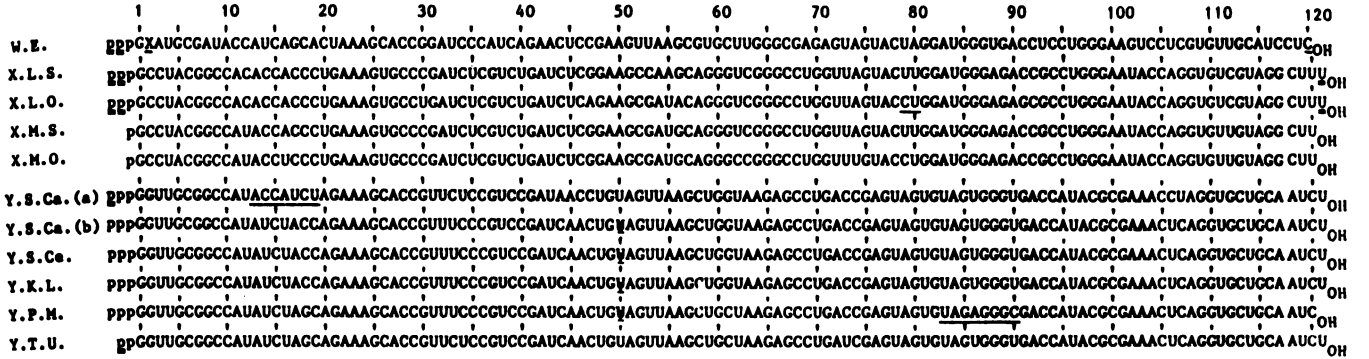


Single underlined sequences are tentative. Double underlined nucleotides or 5' phosphates occur in less than one mole per mole 5S RNA. ? underneath the 3' terminal U of the D.B. sequence indicates that it has not clearly been identified as uridine. For abbreviations of organisms and literature references see opposite page.

Eukaryotic 5S RNA Sequences

Abbreviation	Source	Reference Number
B.B.	Broad bean (*Vicia faba*)	30, 31
C (a)	Chicken (*Gallus gallus*), embryo fibroblast culture	32
C (b)	Chicken, embryo fibroblast culture	33
C.F.	*Crithidia fasciculata*	34
C.P.	Chlorella pyrenoidosa 211/8b	35
D.	Duckweed (*Lemna minor*)	28
D.M.	*Drosophila melanogaster* F6 of KC	36
D.B.	Dwarf bean (*Phaseolus vulgaris*)	30, 31
H.L.	HeLa cells	37, 38
K.B.	KB cells	39, 40
L.V.	*Lytechinus variegatus* (sea urchin)	41
Re.	Reptile (*Iguana iguana*)	42
Ry.	Rye (*Secale cereale* c.v. Lovaszpatonai)	30, 31
R.T.	Rainbow trout (*Salmo gairdneri*, RTG-2)	43
S.	Sunflower (*Helianthus anuus*)	30, 31
To.	Tomato (*Lycopersicum esculentum*)	30, 31
Tu.	Turtle (*Terrapene carolina*, TH-I line of heart cells)	44
T.t.	*Tetrahymena thermophila*	45

EUKARYOTIC 5S RNA SEQUENCES



EUKARYOTIC 5S RNA PRECURSORS

p.D.M. Drosophila melanogaster 5S RNA sequence plus at 3' end ... CGUCCACAACUUUUUU$_{OH}$ (125 130 135)

p.H.L. 5S RNA synthesized by isolated HeLa cell nuclei in vitro was found to terminate at the 3' end with CUU$_{OH}$ (60%), CUUU$_{OH}$ (20%) and CUUUU$_{OH}$ (20%).

Single underlined sequences are tentative. Double underlined nucleotides or 5' phosphates occur in less than one mole per mole 5S RNA. X in W.E. is not certain; could be occupied by one or more unknown nucleotides.
For abbreviation of organisms and literature references see opposite page.

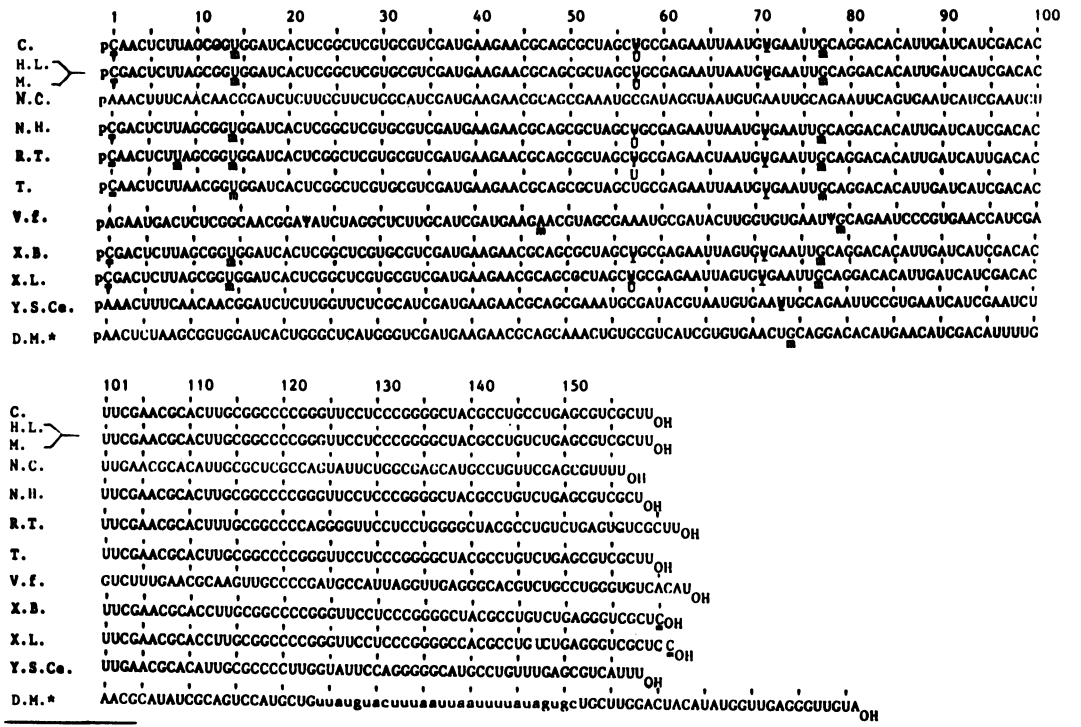
Eukaryotic 5S RNA Sequences

Abbreviation	Source	Reference Number
W.E.	Wheat embryo (Thatcher variety)	40, 42-44, 46-48
X.L.S.	Xenopus Laevis (somatic from kidney)	42-44, 49-51
X.L.O.	Xenopus Laevis (oocytes)	42-44, 49-51
X.M.S.	Xenopus mulleri (somatic)	52
X.M.O.	Xenopus mulleri (oocytes)	52
Y.S.Ca. (a)	Yeast (Saccharomyces carlsbergensis)	53
Y.S.Ca. (b)	Yeast (Saccharomyces carlsbergensis)	54
Y.S.Ce.	Yeast (Saccharomyces cerevisiae)	54, 55
Y.K.L.	Yeast (Kluyveromyces lactis)	54
Y.P.M.	Yeast (Pichia membranaefaciens)	54
Y.T.U.	Yeast (Torulopsis utilis)	56

Eukaryotic 5S RNA Precursors

p.D.M.	Drosophila melanogaster KcO	57
p.H.L.	HeLa cells	58

EUKARYOTIC 5.8S RNA SEQUENCES



The double underlined nucleotides occur in less than one mole per mole 5.8S RNA. Nucleotide written directly under another nucleotide in the sequence indicates that it may also be found in this position. m indicates that the nucleotide is methylated. N.C. sequence has been derived from rDNA.* Nucleotides 1-123 correspond to m5.8S and nucleotides 152-181 to 2S RNA; nucleotides 124-151 are part of the precursor and removed during processing. For abbreviations of organisms and literature references see opposite page.

Eukaryotic 5.8S RNA Sequences

Abbreviation	RNA Source	Reference Number
C.	Chicken (embryonic cells)	59
H.L.	HeLa cells	59,60
M.	Mouse (MPC-11 cells)	60
N.C.	*Neurospora crassa*	61
N.H.	Novikoff hepatoma ascites cells	62
R.T.	Rainbow trout (*Salmo gairdneri*, RTG-2)	63
T.	Turtle (heart cells CCL 50)	64
V.f.	*Vicia faba* (broad bean)	65
X.B.	*Xenopus borealis* (somatic)	66
X.L.	*Xenopus leavis* (somatic)	59,66
Y.S.Ce.	Yeast (*Saccharomyces cerevisiae* A364A gal-1 ade-1 ade-2 ura-1 his-7 lys-2 try-1 (ATCC 22 244))	67
D.M.*	*Drosophila melanogaster*	68

EUKARYOTIC 5.8S RNA PRECURSORS

p.H.L. pUCG instead of pCG has also been found at the 5' end of HeLa cell 5.8S RNA.

p.X.L. Three different 5' nucleotides are reported: pUCG (40%), pCG (20%) and pG (40%). From DNA sequencing data the additional 5' and 3' nucleotide sequences in precursor 5.8S RNA were deduced as follows:

5'end: GCGCGGCCGCGACCGCUCAGACGGCAGCCCGGGUAGCCCUGCCGAGACCGAAAAGGAAAACCGACCGACGCGUCGGCGAGAGCUCG...

3'end:..GACGUCCAUCGCCCCCCGCCGGGUCCGUCCGCGC$_{OH}$

p.Y.S.Ca. The following additional sequence has been found at the 3' end: CCUUCUCAAACAUUCUGp

p.Y.S.Ce. pUAUUAA and pAUAUUAA have been found at the 5' end of this yeast 5.8S RNA.

EUKARYOTIC 5.8S RNA PRECURSORS

Abbreviation	RNA Source	Reference Number
p.H.L.	HeLa cells	59
p.X.L.	Xenopus leavis (somatic)	66,69
p.Y.S.Ca.	Yeast (Saccharomyces carlsbergensis, S-74)	70
p.Y.S.Ce.	Yeast (Saccharomyces cerevisiae S288 α mal gal-2)	71

Single underlined sequences are tentative.

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