

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

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The 1978 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 1979.

PROKARYOTIC 5S RNA SEQUENCES

	1	10	20	30	40	50	60	70	80	90	100	110	120
A.N.													
B.L.													
B.M.													
B.S. (a)													
B.S. (b)													
B.Su.													
B.Q.													
C.P.													
E.C. (a)													
E.C. (b)													

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

PROKARYOTIC 5S RNA SEQUENCES

	1	10	20	30	40	50	60	70	80	90	100	110	120
H.C.	P												
M.S.	P												
P.V.	P												
P.	P												
P.F.	P												
T.A.	P												

PROKARYOTIC 5S RNA PRECURSORS

	1	10	20	140	150	160	170	179
P.B.Su.	P							
P.E.C.	P							

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
H.C.	<u>Halobacterium cutirubrum</u> N.R.C. 34001	18
M.S.	<u>Mycobacterium smegmatis</u> SN2	19
P.V.	<u>Proteus vulgaris</u> (strain not given)	17
P	<u>Photobacter</u> 8265	20
P.F.	<u>Pseudomonas fluorescens</u> ATCC 13430	21
T.A.	<u>Thermus aquaticus</u> ATCC 25104	22
<u>Prokaryotic 5S RNA Precursors</u>		
P.B.Su.	<u>Bacillus subtilis</u> 168	23, 24
P.E.C.	<u>Escherichia coli</u> 217 (sud-1)	25

EUKARYOTIC 5S RNA SEQUENCES

	1	10	20	30	40	50	60	70	80	90	100	110	120
B.B.	P	A	G	U	G	C	C	A	U	A	U	G	C
C.(a)	<u>P</u>	<u>P</u>	<u>G</u>	<u>C</u>	<u>C</u>	<u>A</u>	<u>U</u>	<u>A</u>	<u>A</u>	<u>U</u>	<u>G</u>	<u>C</u>	
C.(b)	<u>P</u>	<u>P</u>	<u>G</u>	<u>C</u>	<u>C</u>	<u>A</u>	<u>U</u>	<u>A</u>	<u>A</u>	<u>U</u>	<u>G</u>	<u>C</u>	
C.P.	P	P	A	G	C	C	A	U	A	U	G	C	
D.M.	P	P	A	G	C	C	A	U	A	U	G	C	
D.B.	P	P	A	G	C	C	A	U	A	U	G	C	
H.L.	P	P	A	G	C	C	A	U	A	U	G	C	
K.B.	P	P	A	G	C	C	A	U	A	U	G	C	
Re.	P	P	A	G	C	C	A	U	A	U	G	C	
Ry.	P	P	A	G	C	C	A	U	A	U	G	C	
R.T.	P	P	A	G	C	C	A	U	A	U	G	C	
S.	P	P	A	G	C	C	A	U	A	U	G	C	
To.	P	P	A	G	C	C	A	U	A	U	G	C	
Tu.	P	P	A	G	C	C	A	U	A	U	G	C	
W.E.	P	P	A	G	C	C	A	U	A	U	G	C	
X.L.S.	P	P	A	G	C	C	A	U	A	U	G	C	
X.L.O.	P	P	A	G	C	C	A	U	A	U	G	C	
X.M.S.	P	P	A	G	C	C	A	U	A	U	G	C	
X.M.O.	P	P	A	G	C	C	A	U	A	U	G	C	

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. X in W.E. is not certain; could be occupied by one or more unknown nucleotides. For abbreviations of organisms and literature references see opposite page.

Eukaryotic 5S RNA Sequences

Abbreviation	Source	Reference Number
B.B.	Broad bean (<u>Vicia faba</u>)	26, 27
C (a)	Chicken (<u>Gallus gallus</u>), embryo fibroblast culture	28
C (b)	Chicken, embryo fibroblast culture	29
C.P.	<u>Chlorella pyrenoidosa</u> 211/8b	30
D.M.	<u>Drosophila melanogaster</u> F6 of KC	31
D.B.	Dwarf bean (<u>Phaseolus vulgaris</u>)	26, 27
H.L.	HeLa cells	32, 33
K.B.	KB cells	34, 35
Re.	Reptile (<u>Iguana iguana</u>)	36
Ry.	Rye (<u>Secale cereale</u> c.v. Lovaszpatonai)	26, 27
R.T.	Rainbow trout (<u>Salmo gairdneri</u> , RTG-2)	37
S.	Sunflower (<u>Helianthus annuus</u>)	26, 27
To.	Tomato (<u>Lycopersicum esculentum</u>)	26, 27
Tu.	Turtle (<u>Terrapene carolina</u> , TH-I line of heart cells)	38
W.E.	Wheat embryo (Thatcher variety)	35 - 41
X.L.S.	<u>Xenopus laevis</u> (somatic from kidney)	42 - 44
X.L.O.	<u>Xenopus laevis</u> (oocytes)	42 - 44
X.M.S.	<u>Xenopus mulleri</u> (somatic)	45
X.M.O.	<u>Xenopus mulleri</u> (oocytes)	45

EUKARYOTIC 5S RNA SEQUENCES

	1	10	20	30	40	50	60	70	80	90	100	110	120
Y. S. Ca. (a)	ppp	g	u	u	g	g	g	g	g	g	g	g	g
Y. S. Ca. (b)	ppp	g	u	u	g	g	g	g	g	g	g	g	g
Y. S. Ca.	ppp	g	u	u	g	g	g	g	g	g	g	g	g
Y. K. L.	ppp	g	u	u	g	g	g	g	g	g	g	g	g
Y. P. M.	ppp	g	u	u	g	g	g	g	g	g	g	g	g
Y. T. U.	ppp	g	u	u	g	g	g	g	g	g	g	g	g

EUKARYOTIC 5S RNA PRECURSORS

p.D.M. <i>Drosophila melanogaster</i>	5S RNA sequence plus at 3' end ...	125	130	135
		OH	OH	OH

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. For abbreviation of organisms and literature references see opposite page.

Eukaryotic 5S RNA Sequences

Abbreviation	Source	Reference Number
Y.S.Ca. (a)	Yeast (<u>Saccharomyces carlsbergensis</u>)	46
Y.S.Ca. (b)	Yeast (<u>Saccharomyces carlsbergensis</u>)	47
Y.S.Ce.	Yeast (<u>Saccharomyces cerevisiae</u>)	47, 48
Y.K.L.	Yeast (<u>Kluyveromyces lactis</u>)	47
Y.P.M	Yeast (<u>Pichia membranaefaciens</u>)	47
Y.T.U.	Yeast (<u>Torulopsis utilis</u>)	49

Eukaryotic 5S' RNA Precursors

Abbreviation	Source	Reference Number
P.D.M.	<u>Drosophila melanogaster</u> KcO	50
P.H.L.	HeLa cells	51

EUKARYOTIC 5.8S RNA SEQUENCES

	1	10	20	30	40	50	60	70	80	90	100
C.	P	<u>A</u>	<u>C</u>	<u>U</u>	<u>U</u>	<u>A</u>	<u>G</u>	<u>G</u>	<u>G</u>	<u>A</u>	<u>C</u>
H.L.	P	<u>G</u>	<u>A</u>	<u>C</u>	<u>U</u>	<u>U</u>	<u>A</u>	<u>G</u>	<u>G</u>	<u>A</u>	<u>C</u>
N.C.	P	<u>A</u>	<u>A</u>	<u>C</u>	<u>U</u>	<u>U</u>	<u>A</u>	<u>G</u>	<u>G</u>	<u>A</u>	<u>C</u>
N.H.	P	<u>G</u>	<u>A</u>	<u>C</u>	<u>U</u>	<u>U</u>	<u>A</u>	<u>G</u>	<u>G</u>	<u>A</u>	<u>C</u>
R.T.	P	<u>A</u>	<u>C</u>	<u>U</u>	<u>U</u>	<u>A</u>	<u>G</u>	<u>G</u>	<u>A</u>	<u>C</u>	
T.	P	<u>A</u>	<u>C</u>	<u>U</u>	<u>U</u>	<u>A</u>	<u>G</u>	<u>G</u>	<u>A</u>	<u>C</u>	
X.B.	P	<u>G</u>	<u>A</u>	<u>C</u>	<u>U</u>	<u>U</u>	<u>A</u>	<u>G</u>	<u>G</u>	<u>A</u>	<u>C</u>
X.L.	P	<u>G</u>	<u>A</u>	<u>C</u>	<u>U</u>	<u>U</u>	<u>A</u>	<u>G</u>	<u>G</u>	<u>A</u>	<u>C</u>
Y.S.Ce.	P	<u>A</u>	<u>A</u>	<u>C</u>	<u>U</u>	<u>U</u>	<u>A</u>	<u>G</u>	<u>G</u>	<u>A</u>	<u>C</u>
	101	110	120	130	140	150					
C.	U	<u>C</u>	<u>G</u>	<u>A</u>	<u>C</u>	<u>C</u>	<u>C</u>	<u>G</u>	<u>G</u>	<u>G</u>	<u>C</u>
H.L.	U	<u>C</u>	<u>G</u>	<u>A</u>	<u>C</u>	<u>C</u>	<u>C</u>	<u>G</u>	<u>G</u>	<u>G</u>	<u>C</u>
N.C.	U	<u>A</u>	<u>A</u>	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>	<u>G</u>	<u>G</u>	<u>G</u>	<u>C</u>
N.H.	U	<u>C</u>	<u>G</u>	<u>A</u>	<u>C</u>	<u>C</u>	<u>C</u>	<u>G</u>	<u>G</u>	<u>G</u>	<u>C</u>
R.T.	U	<u>C</u>	<u>G</u>	<u>A</u>	<u>C</u>	<u>C</u>	<u>C</u>	<u>G</u>	<u>G</u>	<u>G</u>	<u>C</u>
T.	U	<u>C</u>	<u>G</u>	<u>A</u>	<u>C</u>	<u>C</u>	<u>C</u>	<u>G</u>	<u>G</u>	<u>G</u>	<u>C</u>
X.B.	U	<u>C</u>	<u>G</u>	<u>A</u>	<u>C</u>	<u>C</u>	<u>C</u>	<u>G</u>	<u>G</u>	<u>G</u>	<u>C</u>
X.L.	U	<u>C</u>	<u>G</u>	<u>A</u>	<u>C</u>	<u>C</u>	<u>C</u>	<u>G</u>	<u>G</u>	<u>G</u>	<u>C</u>
Y.S.Ce.	U	<u>G</u>	<u>A</u>	<u>C</u>	<u>C</u>	<u>C</u>	<u>C</u>	<u>G</u>	<u>G</u>	<u>G</u>	<u>C</u>

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. For abbreviations of organisms and literature references see opposite page, N.C. sequence has been derived from rDNA.

Eukaryotic 5.8S RNA Sequences

Abbreviation	RNA Source	Reference Number
C.	Chicken (embryonic cells)	52
H.L.	HeLa cells	52
N.C.	<u>Neurospora crassa</u>	53
N.H.	Novikoff hepatoma ascites cells	54
R.T.	Rainbow trout (<u>Salmo gairdneri</u> , RTG-2)	55
T.	Turtle (heart cells CCL 50)	56
X.B.	<u>Xenopus borealis</u> (somatic)	57
X.L.	<u>Xenopus leavis</u> (somatic)	52, 57
Y.S.Ce.	Yeast (<u>Saccharomyces cerevisiae</u> A364A gal-1 ade-1 ade-2 ura-1 his-7 lys-2 try-1 (ATCC 22 244))	58

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: GCGCGCCGGACCGCUCAGCGCAGCCCGGGUAGCCCGCCGAGACCCGAAAGGAAACCCGACCGGUCGGGAGAGCUUG...
 3' end: ..GACGUCCAUCGCCCGCGGUCGCGCGOH

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

p.Y.S.Ce. pUAUUA and pAUUUA 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	52
p.X.L.	<u>Xenopus leavis</u> (somatic)	57, 59
p.Y.S.Ca.	Yeast (<u>Saccharomyces carlsbergensis</u> , S-74)	60
p.Y.S.Ce.	Yeast (<u>Saccharomyces cerevisiae</u> S288 α mal gal-2)	61

Single underlined sequences are tentative.

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