

TABLE I
ABUNDANCE CLASSES IN MOUSE LIVER CYTOPLASMIC POLY(A)RNA DETERMINED BY cDNA-POLY(A)RNA
HYBRIDIZATION KINETICS^a

mRNA abundance class	Fraction of cDNA reacting	Fraction of poly(A) RNA in each class ^b	k^c (M ⁻¹ s ⁻¹)	k_{pure}^d (s ⁻¹)	Complexity ^e (nucleotides)	Number of different 2000 NT sequences	Fraction of poly(A)RNA mass in each sequence	Molecules of each sequence per cell ^f
High	0.23	0.29	18	62	2.5×10^4	12	2.4×10^{-2}	7200
Intermediate	0.21	0.27	0.63	2.3	6.7×10^5	330	8.2×10^{-4}	250
Low	0.35	0.44	0.055	0.12	1.3×10^7	6400	6.9×10^{-5}	21

^a The data presented in this table were obtained by Ryffel and McCarthy (3). Their data were fit by least-squares methods using three pseudo-first-order kinetic components as shown. After this analysis had been carried out, additional data became available (242, 243). When analyzed as described here and in the text, these measurements yield mRNA concentrations within a factor of 2 of those listed in the last column above.

^b Normalized for the reactivity of the cDNA with poly(A)RNA. We assume that an equal fraction of the sequences present in each abundance class is transcribed into cDNA by the reverse transcriptase.

^c In 0.24 M phosphate buffer.

^d The rate is corrected to that expected if all the RNA were in each individual abundance class.

^e The kinetic standard is an ovalbumin mRNA-cDNA reaction measured under the same conditions (4), where $k = 770 \text{ M}^{-1} \text{ s}^{-1}$. The length of the ovalbumin standard mRNA is taken as 2000 nucleotides, the number average molecular weight of mammalian cytoplasmic poly(A)RNA used in these reactions (1-3). It is assumed that the cDNAs were of the same length in both reactions. The complexity of the mRNA class is thus $(770/k_{\text{pure}})$ (2000 NT).

^f The total RNA content is taken as 33 pg cell⁻¹. The RNA to DNA ratio in rat and mouse liver is 4.0 as summarized in Leslie (11), and the DNA content is about 8.2 pg cell⁻¹ (12), using 7.3 pg as the human liver cell DNA content. Approximately 1% of the total cell RNA is cytoplasmic poly(A)RNA. Polyadenylated RNA has been measured to be 1-1.5% of mouse liver cytoplasmic RNA (3; G. U. Ryffel, personal communication), about 1% of rat liver postmitochondrial polysomal RNA (13), and 0.4-1% of the total postmitochondrial RNA (14, 15). The number of cytoplasmic poly(A)RNA molecules averaging 2000 nucleotides in length is thus 3.0×10^5 cell⁻¹. Due primarily to a higher value for the poly(A)RNA content of cytoplasmic RNA, a number of 5.1×10^5 polyadenylated mRNA molecules per mouse liver cell was recently calculated (243).