

Typical parameter values for the bacterial *E. coli* cell, the single-celled eukaryote *Saccharomyces cerevisiae* (budding yeast), and a mammalian cell line

Property	<i>E. coli</i>	Yeast (<i>S. cerevisiae</i>)	Mammalian (e.g. Human Fibroblast)
Cell volume	0.3-3 μm^3	30-100 μm^3	1,000-10,000 μm^3
Proteins/1 μm^3 cell volume	2-4 $\times 10^6$		
Proteins/cell	10^6	10^8	10^{10}
Mean diameter of protein	5 nm		
Genome size	4.6 $\times 10^6$ bp	12 $\times 10^6$ bp	3 $\times 10^9$ bp
Number protein coding genes	4500	6600	$\approx 20,000$
Regulator binding site length	~ 10 bp		
Promoter length	~ 100 bp	~ 1000 bp	$\sim 10^4$ - 10^5 bp
Gene length	~ 1000 bp	~ 1000 bp	$\sim 10^4$ - 10^6 bp (with introns)
Concentration of one protein/cell	~ 1 nM	~ 10 pM	~ 0.1 - 1 pM
Diffusion time of protein across cell; $D = 10 \mu\text{m}^2/\text{sec}$	~ 0.01 sec	~ 0.3 sec	~ 1 - 10 sec
Diffusion time of small molecule across cell; $D = 100 \mu\text{m}^2/\text{sec}$	~ 1 ms	~ 30 ms	~ 0.1 - 1 sec
Time to transcribe a gene	< 1 min (80 nts/sec)	~ 1 min	~ 30 min (incl. mRNA processing)
Time to translate a protein	< 1 min (20 aa/sec)	~ 1 min	~ 30 min (incl. mRNA export)
Typical mRNA lifetime	2-5 min	~ 10 min to over 1 h	5-100 min to over 10 h
Minimal doubling time	20 min	1h	20 h
Ribosomes/cell	$\sim 10^4$	$\sim 10^5$	$\sim 10^6$
Transitions between protein states (active/inactive)	1-100 μsec		
Timescale for equilibrium binding of small molecule to protein (diffusion limited)	~ 1 msec (1 μM affinity)	~ 1 sec (1 nM affinity)	~ 1 sec (1 nM affinity)
Timescale of transcription factor binding to DNA site	~ 1 sec		
Mutation rate	$\sim 10^{-8}$ - 10^{-10} /bp/replication		