

Prokaryotic Biology; MCB 4403
tRNA Genes of *Escherichia coli*
DUE 10/14/05

Escherichia coli (and other similar bacteria) contains in its genome about 120 RNA genes. These genes code for a variety of RNA products, most of which have known functions. Examples are the three ribosomal RNA genes which code for the 16S, 23S and 5S rRNAs found in all bacterial ribosomes, and the 50 or more different transfer RNA (tRNA) genes that are transcribed into the tRNAs that function as the adapter molecules in protein synthesis. One other RNA gene commonly found is the M1 RNA gene, which codes for the enzymatic portion of Ribonuclease P, the prototypical ribozyme. Since the genome of *E. coli* has been completely sequenced all of these genes are known. For example, the *E. coli* genome contains 86 tRNA genes coding for 47 different tRNAs (many genes are duplicated).

Your assignment is to locate a tRNA gene on the *E. coli* genetic map, to find neighboring genes (two closest, flanking neighbors), and to find the nucleotide sequence of the gene. You also need to find the promoter and terminator sites that are needed for the transcription of the gene. In addition, on a separate page, you are to **label** a "clover-leaf" diagram of the tRNA showing for example, the amino acid stem and the anticodon. I would like your results **TYPED** and reported in the same format. On the back of this page is an example of the format I would like, using the tRNA_{pro2} gene, *proL*, as an example. A blank format page with your specific gene assignment is attached. Make sure you identify the tRNA gene sequence and both the promoter and terminator sequences.

In reporting your sequence you need to report the entire sequence of the gene and its promoter and terminator (if it is a single gene). If your gene is part of a gene cluster you must report the promoter and terminator of the cluster. To find the promoter and terminator sequences in a gene cluster, you will have to identify the sequences of the first and last genes of the cluster. **I suggest that you first locate the latest *E. coli* genetic map, then find the information on your gene (and its neighbors) and its direction of transcription.**

References for the *E. coli* Genetic Map:

1. CGSC: *E. coli* Genetic Stock Center, maintained by Mary Berlyn.
<http://cgsc.biology.yale.edu/>
2. Berlyn, M. K. B. (1998) Linkage map of *Escherichia coli* K-12, Edition 10: The traditional map. Microbiol. Molec. Biol. Rev. 62:814-984. [see: Rudd K. E., ibid. pp. 985-1019 for the physical map.]