

BERG/STRYER VI STUDY GUIDE

CHAPTER 29

1. HOMEWORK 1, 2, 3, 6, 18. Understand the "overview" and know the five items on page 823. We will mostly learn about prokaryotic transcription. The **promoter** site has a "-35" region and also a sequence centered around -10 called a "**Pribnow Box**" (Fig 29.4). Both are shown at the top of 825. The promoter is found only in the DNA, and is not transcribed. The **RNA Pol** holoenzyme, including the σ (sigma) subunit as well as $\alpha_2\beta\beta'$ must be present for transcription to start. The beta subunit contains the polymerase active site. **Sigma** is only present during **initiation** and then drops off. The first base transcribed is always a purine, so new unprocessed RNA always starts with pppA or pppG. The elongation phase does not require an ATP driven helicase, because the "**transcription bubble**" (about 17 base pairs) travels along with the enzyme, and the energy from re-annealing of DNA strands balances the energy to pull the strands apart (828). RNA Pol can add about 50 nucleotides per second. Understand that the template strand of DNA is called the "-" strand, and the "+" strand of DNA closely resembles the RNA synthesized except for the differences where T and U occur. **Termination** of prokaryotic transcription occurs two main ways. One is called "**hairpin poly-U**" and the other involves the **Rho protein**. In both cases, the signal is not recognized as DNA, but only *after* it has been transcribed into RNA (829-830). Understand how **rifampicin** and **actinomycin** inhibit the prokaryotic RNA Polymerase (831).

2. RNA is subject to modification and processing. **Modification** means that the structure is chemically changed, for example by methylation (832). **Processing** of prokaryotic RNA means that it is cut into useful pieces (Fig 29.14). Processing of eukaryotic mRNA also includes **splicing**, which is necessary during removal of introns. Prokaryotic **mRNA** is neither modified nor processed, in contrast to all other kinds of RNA. Because eukaryotic transcription occurs in the nucleus (Fig 29.15) eukaryotic modification and processing can be very elaborate. Know that eukaryotic **RNA Pol II** is mainly used for **mRNA** synthesis, and is very strongly inhibited by the mushroom toxin **α -amanitin** (835). Other RNA Pols produce rRNA and tRNA. Mod and Proc of a typical eukaryotic tRNA is shown in Fig 29.25. Messenger RNA in eukaryotes receives a **5' cap** structure and a **3' poly-A tail**. You are not responsible for 842-851.