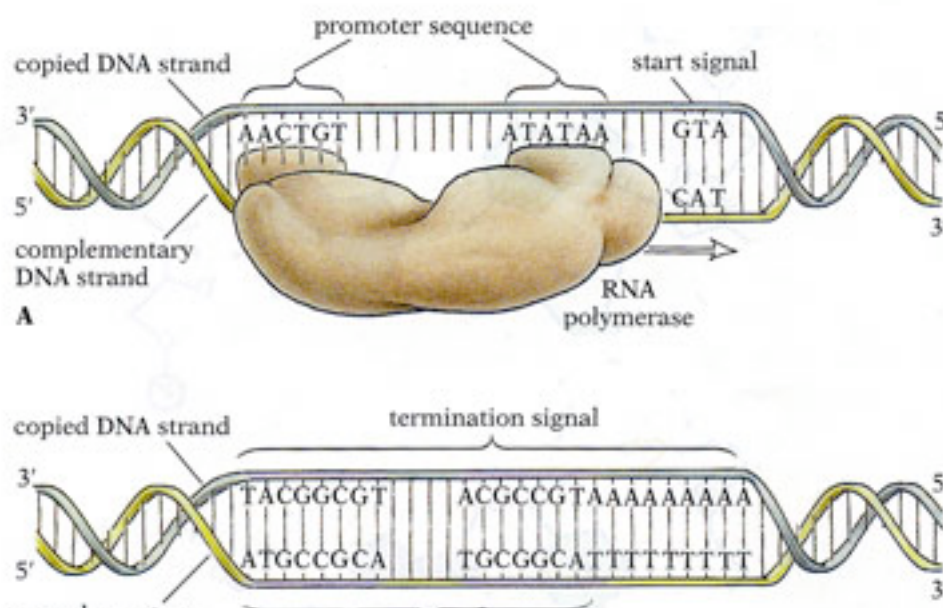
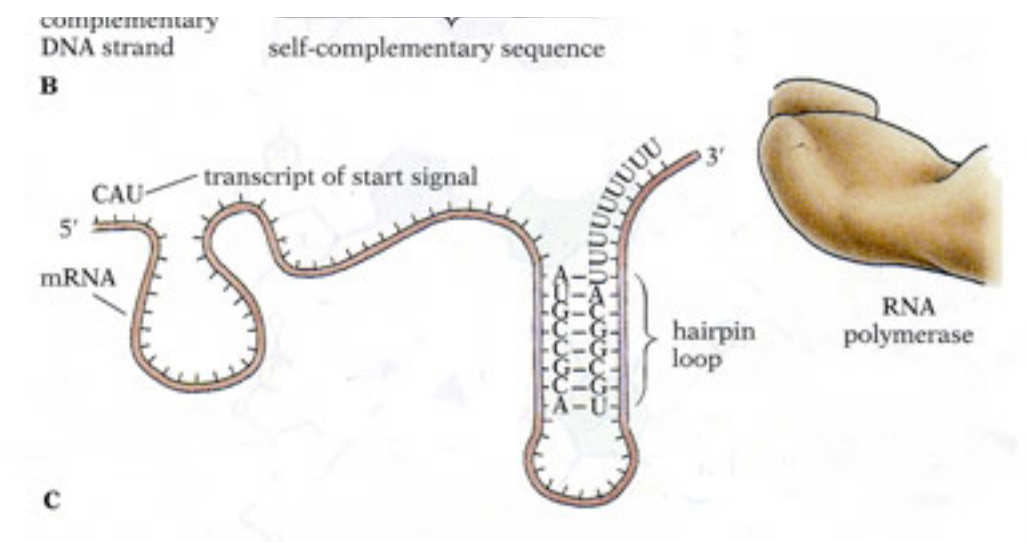


Termination Signal For Transcription In Prokaryotes

In most prokaryotes, synthesis of mRNA continues until the polymerase encounters a termination signal. The termination signal has two components. First there is a region with a base sequence that allows the corresponding bases in the tail of the mRNA to pair off and bind together to form a small loop, known as a **hairpin loop** (see figure below). Second, the bases for the hairpin loop are then followed on the template strand by a run of four to eight adenines.

When the polymerase moves into the region of the adenine run, the hairpin loop forms in the mRNA just produced and, apparently from the physical stress it puts on the enzyme complex, slows or temporarily halts transcription. Two things now happen that terminate the production of the mRNA. First, because the loop sequence has pulled away from the DNA, that portion of the gene is able to reform its double helix, adding yet more strain to the complex. Second, the weak bonding between the run of adenines in the DNA and the uracils of the mRNA transcript (only two hydrogen bonds between each base pair) is unable to anchor the mRNA to the gene for long. The pause and the stress together allow the transcribed copy and its polymerase to drift away from the chromosome.





Transcription signals in *E. coli* DNA. (A) RNA polymerase binds to a region of DNA with the sequences shown. Once the polymerase is bound, transcription begins with the GTA signal (corresponding to the CAT sequence on the complementary strand) and proceeds until a termination signal is encountered. (B) The termination signal consists of a “self-complementary” sequence – one that can bind to itself – and four to eight adenines (corresponding to thymines on the complementary strand). (C) At this point, the tail of the mRNA forms a short double-helix hairpin loop, and the polymerase stops synthesizing. Note that RNA polymerase inserts a uracil wherever DNA polymerase would add a thymine.

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