

3' Modification:

(Figure 3)

Area of discussion-Termination of Transcription: Considering RNA polymerase I activity

In eukaryotes, the mechanisms for terminating transcription differ for each of the three RNA polymerases. Transcription of pre-rRNA genes by **RNA polymerase I** is terminated by a mechanism that requires a **polymerase-specific termination factor**. This DNA-binding protein binds to a specific DNA sequence downstream of the transcription unit. Efficient termination requires that the termination factor bind to the template DNA in the correct orientation.

Purified **RNA polymerase III** terminates after **polymerizing a series of U residues**. The deoxy(A)_n-ribo(U)_n DNA-RNA hybrid that results when a stretch of U's are synthesized is particularly unstable compared with all other base-paired sequences. The ease with which this hybrid can be melted probably contributes to the mechanism of termination by RNA polymerase II.

Nielsen (2013)

Termination of transcription is an obligatory step following synthesis of the transcript, which leads to dissociation of RNA polymerase (RNAP) and the transcript from the template DNA. However, apparently different mechanisms are utilized by evolutionary conserved multi-subunit RNAPs from bacteria, archaea, and three eukaryotic RNAPs to terminate transcription.

Pol III terminates after synthesis of a **poly-U stretch** and most studies have focused on the efficiency of recognition of the **poly-T** (on the nontemplate strand) termination signal. Both upstream and downstream sequences were shown to influence efficiency of recognition.

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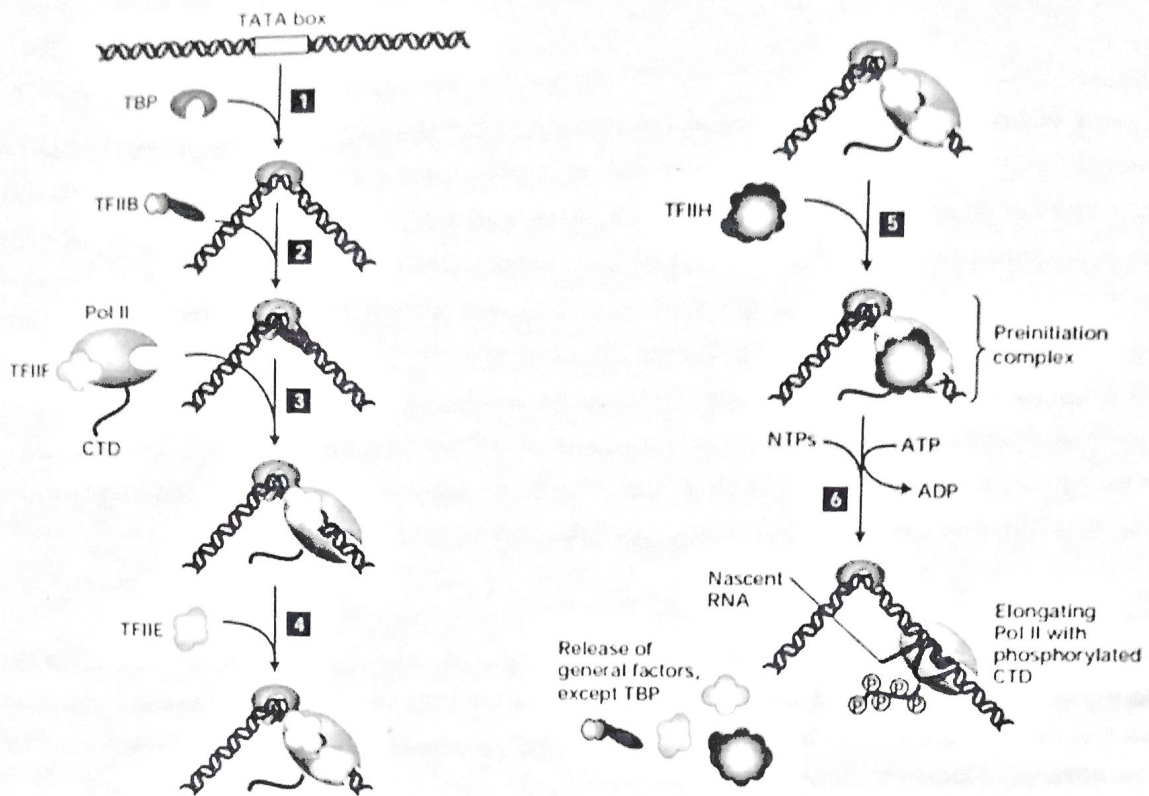


Figure 1: In vitro assembly of RNA polymerase II preinitiation complex.

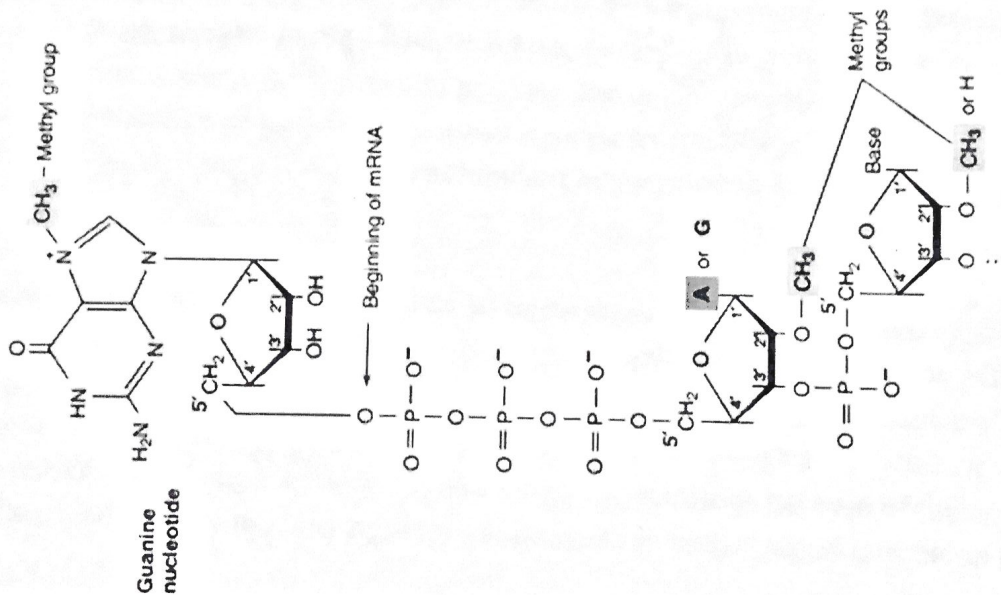


Figure 2: Cap structure at the 5' end of a eukaryotic mRNA. The cap results from the addition of a guanine nucleotide and two methyl groups.