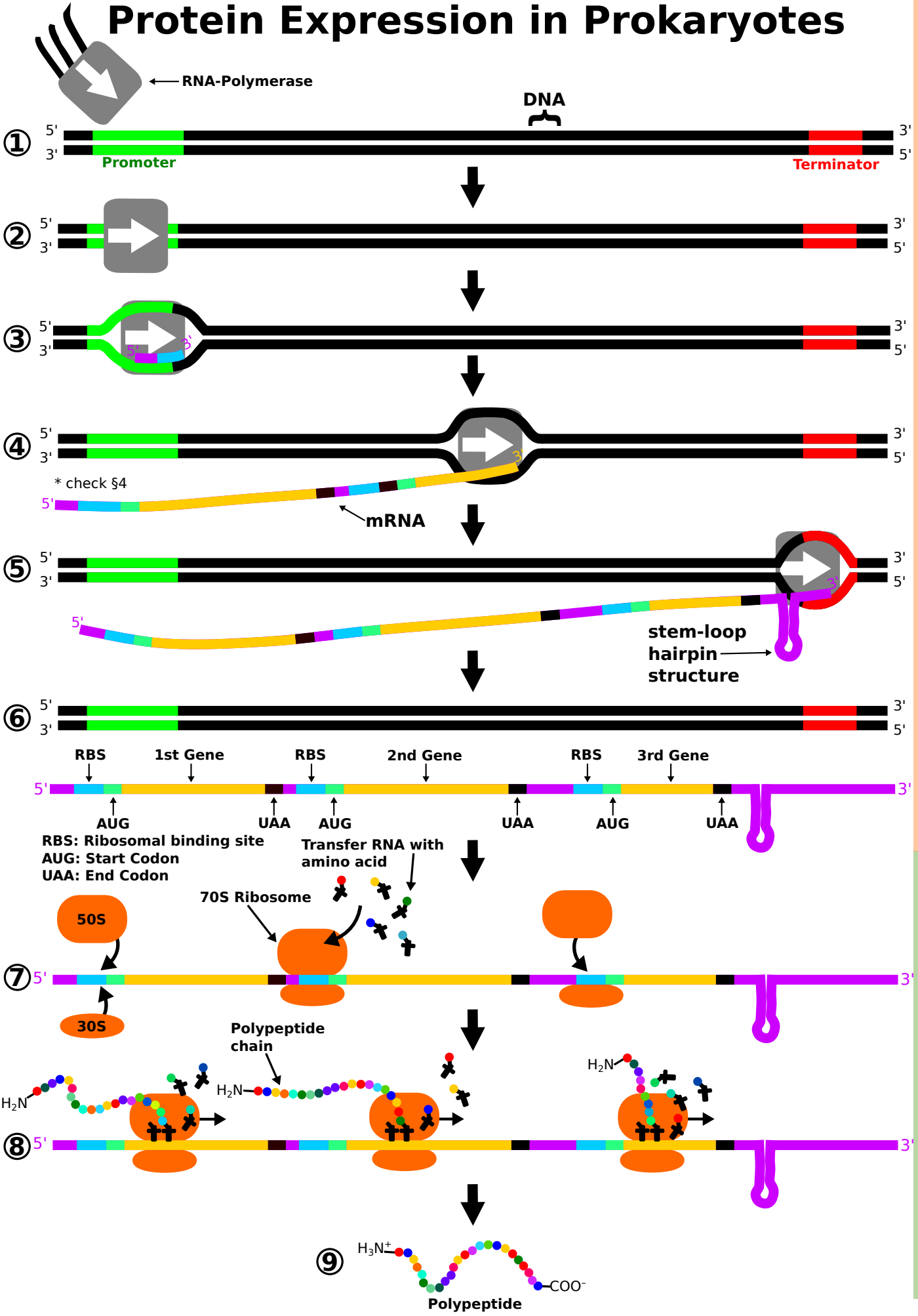
Protein Expression in Prokaryotes



Transcription

Translation

Transcription

1.) RNA – Polymerase attaches to the promoter. The promoter is a region on the DNA, which is located upstream, near the transcription start side.

2.) Transcription is initiated.

3.) The RNA-Polymerase is starting to synthesize the mRNA from the 5’ to the 3’ direction.

4.) The RNA-Polymerase continues to synthesize the mRNA. (Note: Unlike as in eukaryotic mRNA, the prokaryotic mRNA does not receive a 5’ cap)

5.) The terminator region of the DNA codes a palindromic sequence. This sequence causes the mRNA to form a stem-loop hairpin structure. This hairpin structure leads to the dissociation of the RNA-Polymerase from the DNA.

6.) The transcription is finished, and the mRNA is ready to be translated. One translated mRNA can contain more than one gene, which encodes a protein. Thus more than one protein can be encoded on one mRNA. Note: Prokaryotic cells do not have a nucleus. Unlike in Eukaryotic cells, the mRNA does not need to be modified by splicing. Thus, the mRNA in Prokaryotic cells is ready to be translated immediately after transcription.

Translation

7.) The 50S and 30S ribosome subunits are assembled together to form the whole ribosome complex (70S).

8.) Once the ribosome is assembled, the translation of the mRNA is initiated from a start codon (AUG) on the mRNA. tRNA’s charged with amino acids enter the ribosomes, where their amino acid is transferred on to the growing polypeptide chain. Once the tRNA donated its amino acid, it exits the ribosome. Note: The polypeptide chain is being built from N-terminus ($–NH3^{+}$) to C-terminus ($–COO^{-}$).

9.) The built polypeptide chain is now ready to be folded into the destined protein.