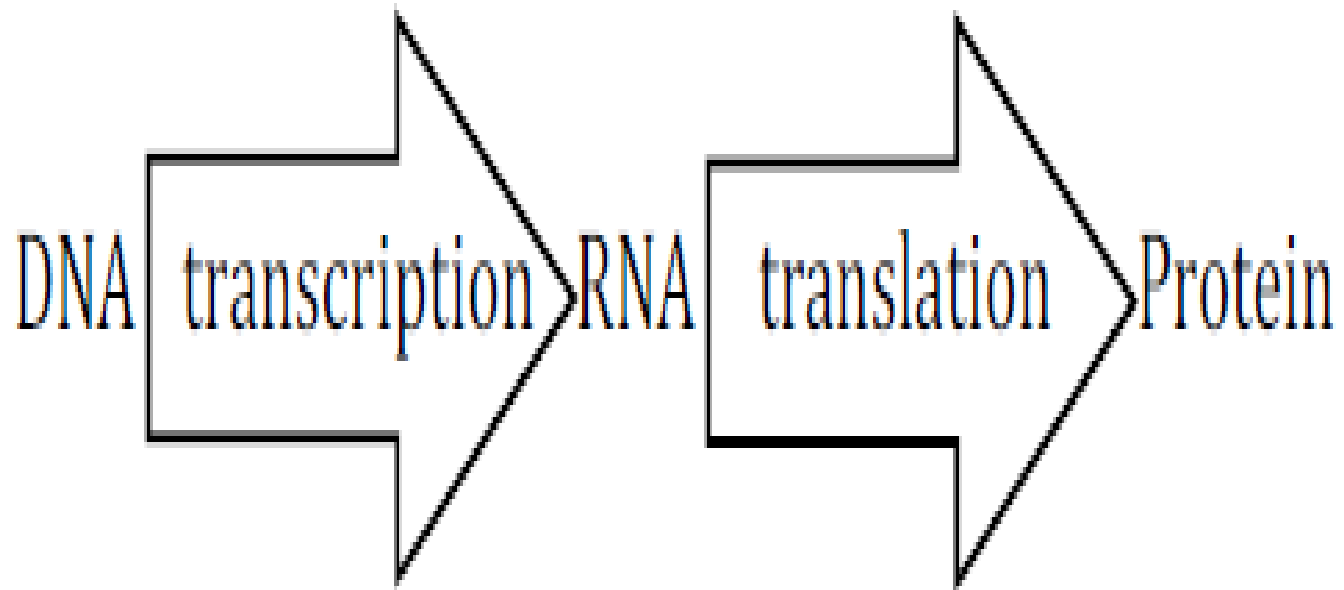


Protein Synthesis

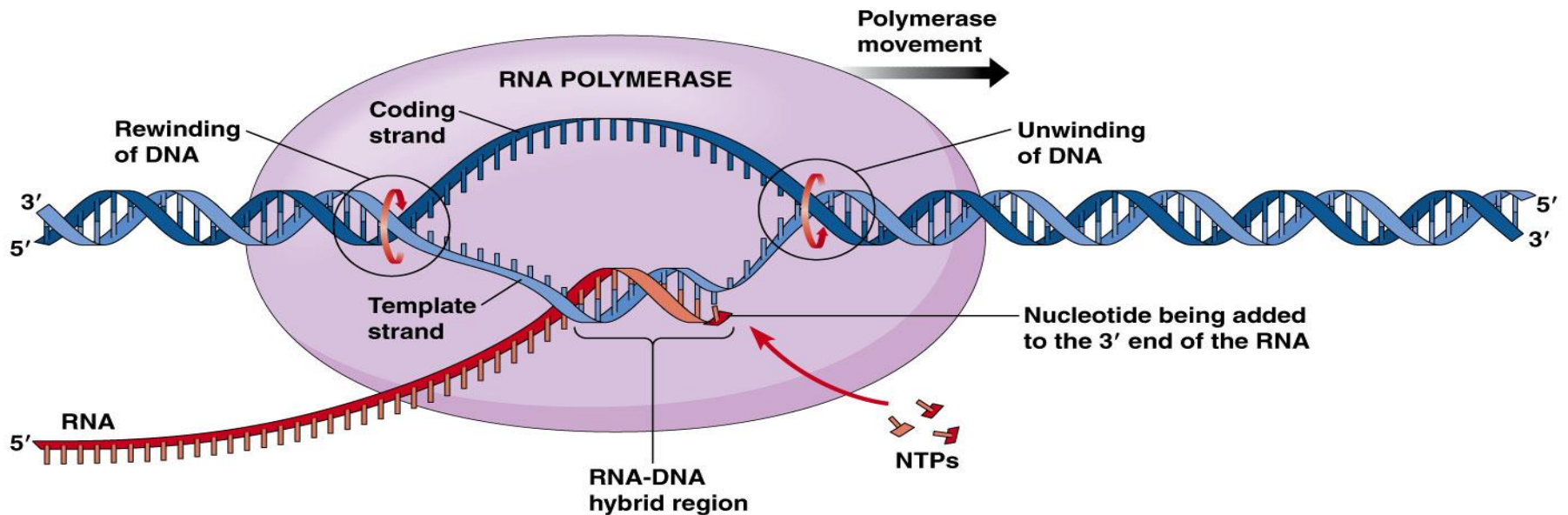
Transcription & Translation

Central Dogma

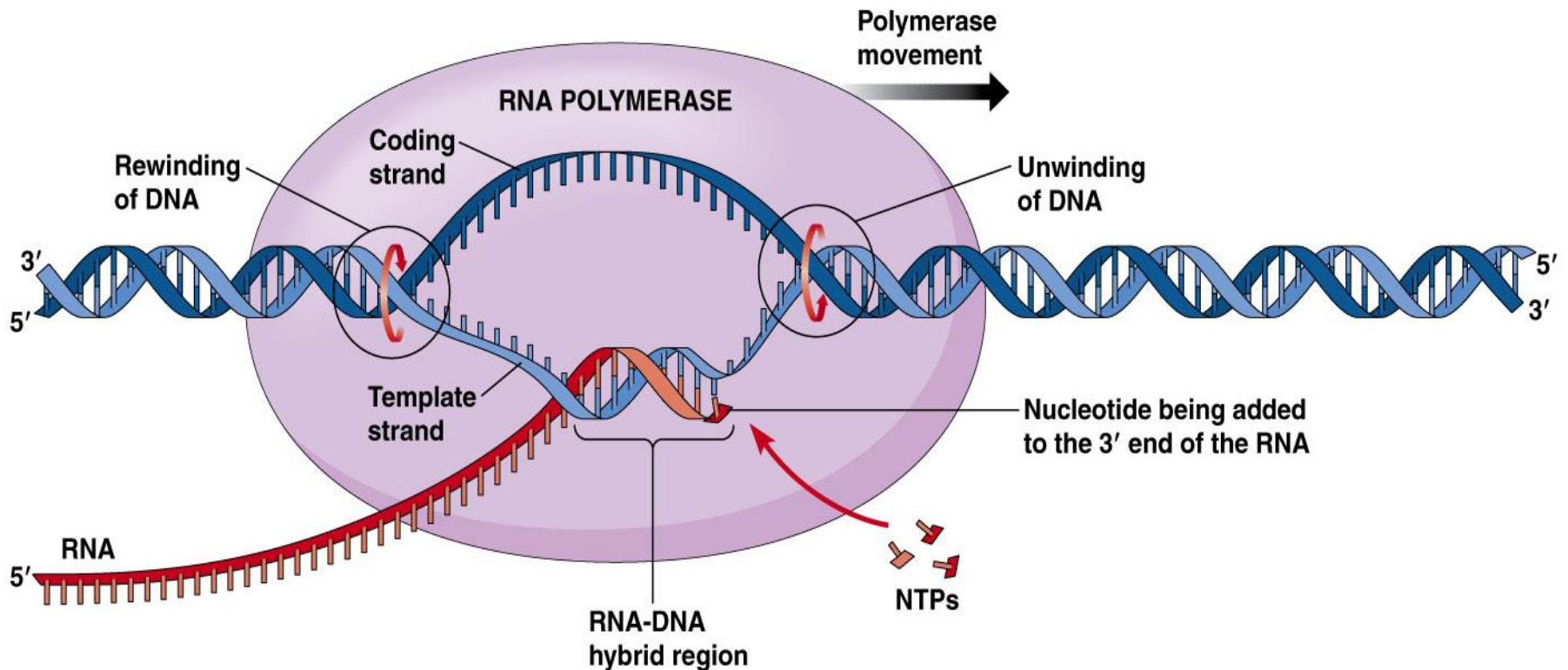


Transcription

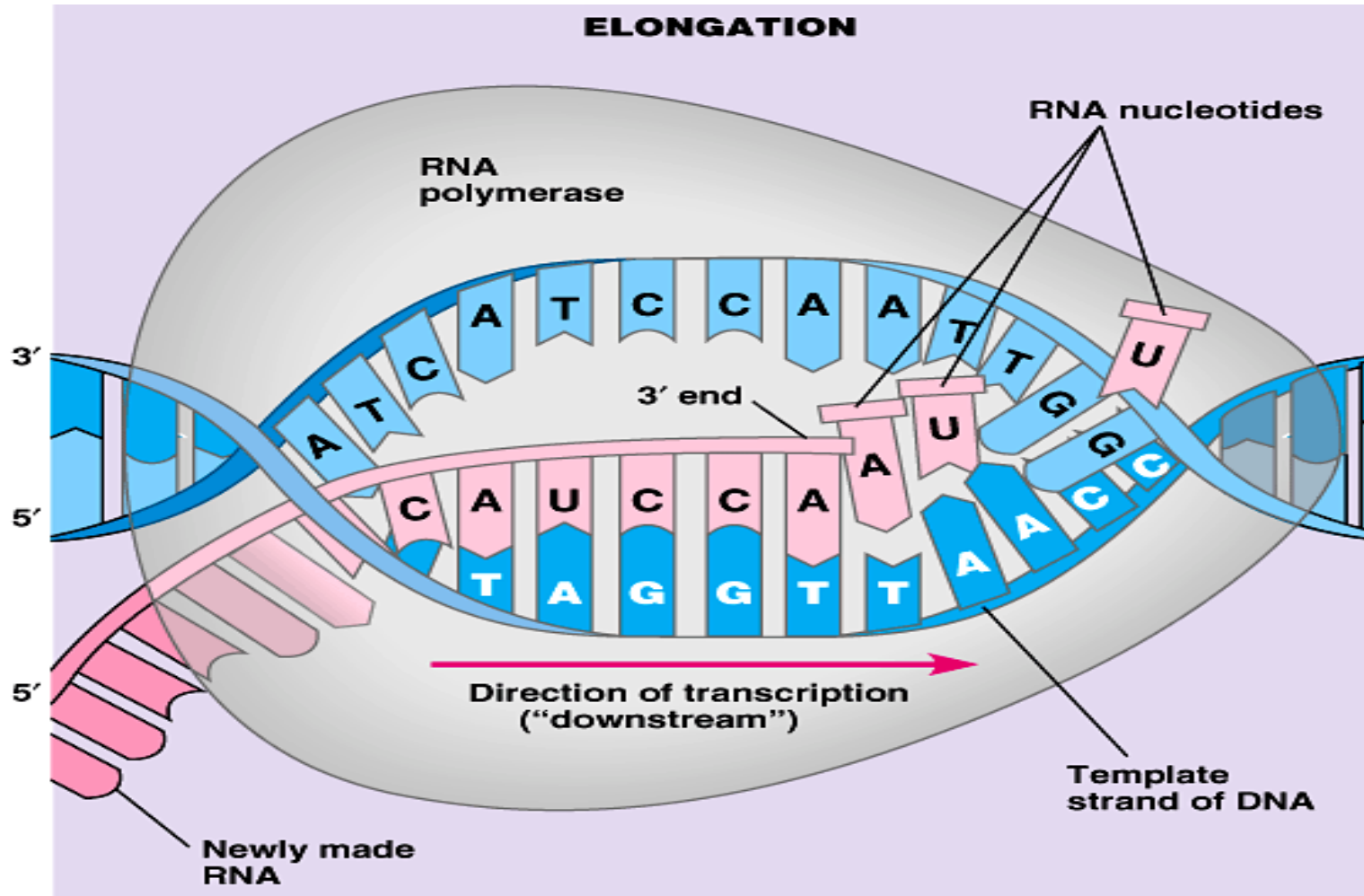
- DNA writes a “script” for the ribosome to follow as it builds a protein. The “script” is an RNA copy of the instructions contained in the DNA molecule.



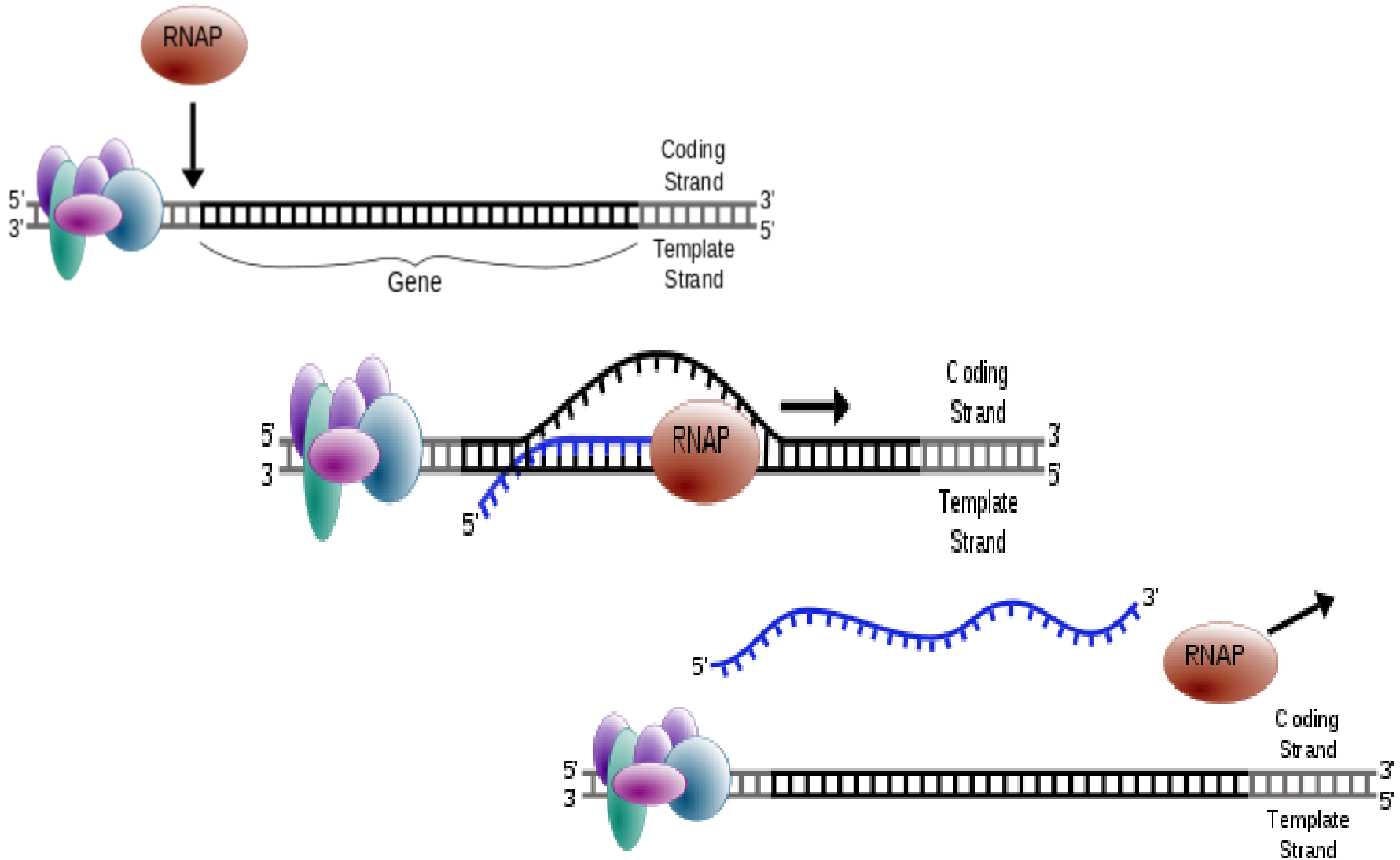
- First the DNA molecule is unwound by the molecule helicase
- Then RNA Polymerase adds complementary RNA nucleotides to the exposed DNA bases on the template strand



- RNA Polymerase can only move in one direction, so only one side of the DNA molecule (template strand) is used for the construction of an RNA molecule

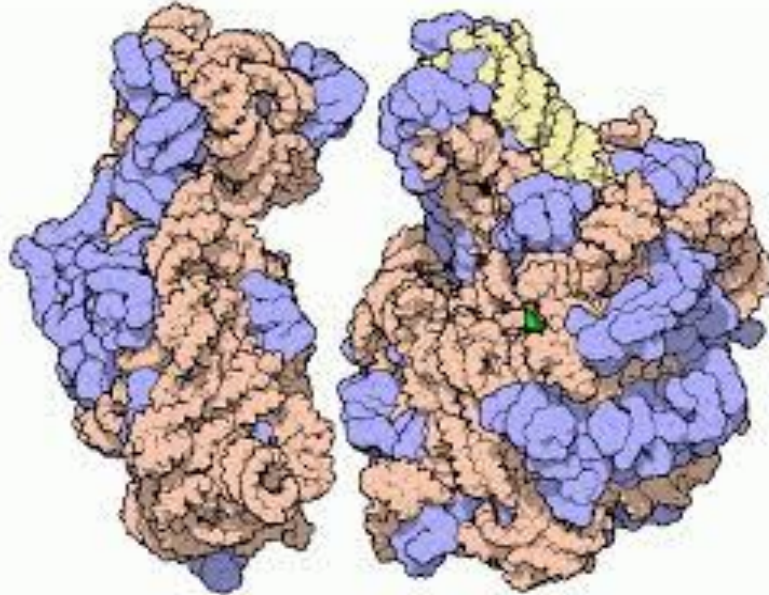


- When transcription is complete the RNA molecule is released

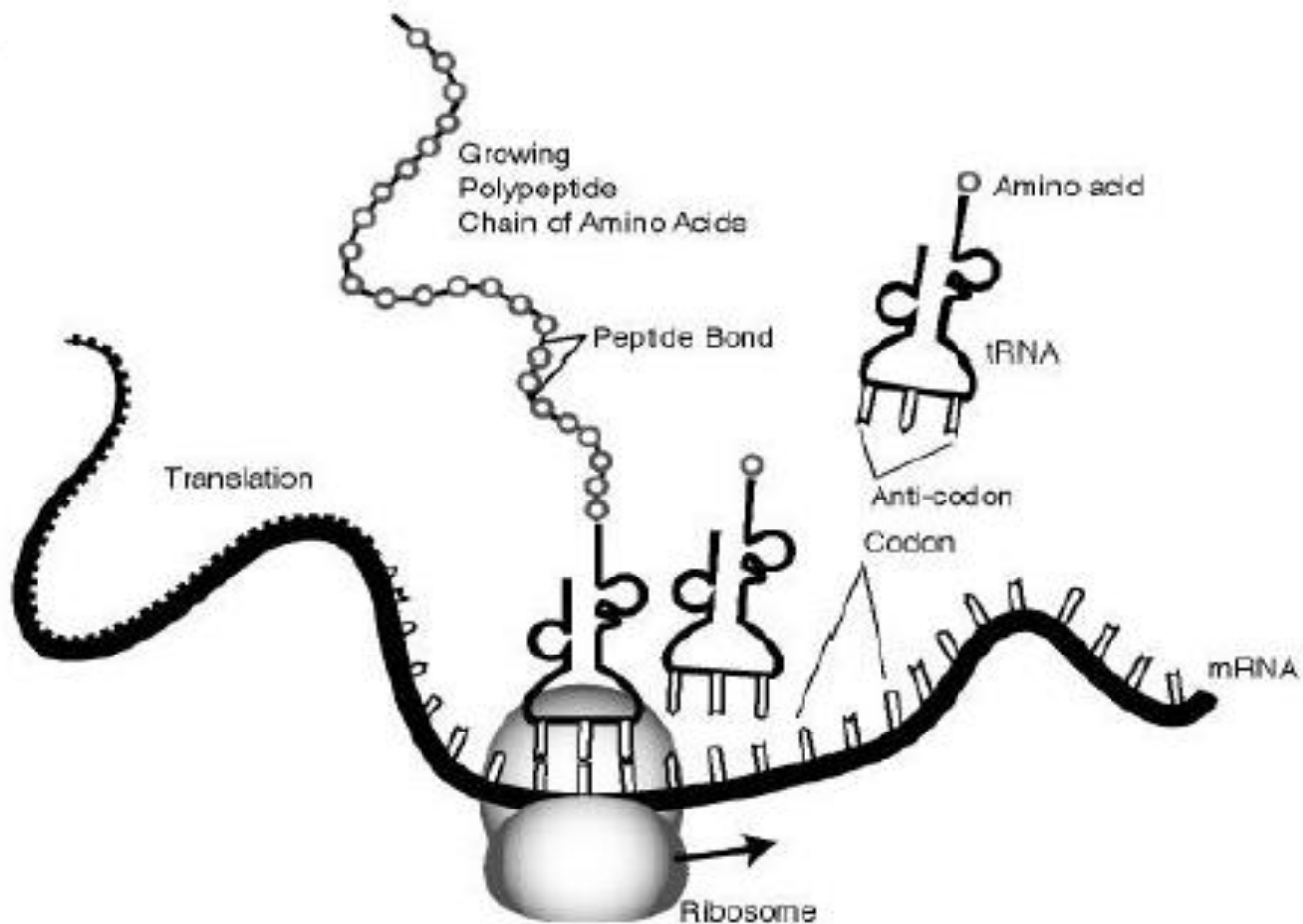


3 Types of RNA

- rRNA
 - Structure: major structural component of ribosomes (2/3 rRNA + 1/3 protein)



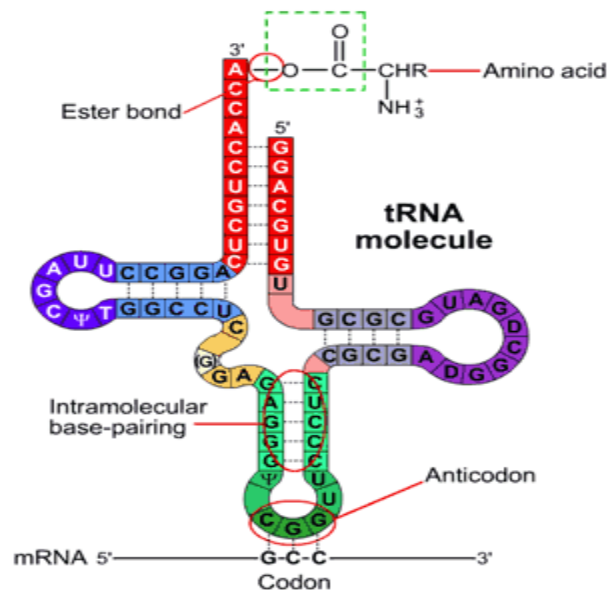
- Function: attaches to mRNA, positions tRNA on the mRNA & forms peptide bonds between amino acids during translation

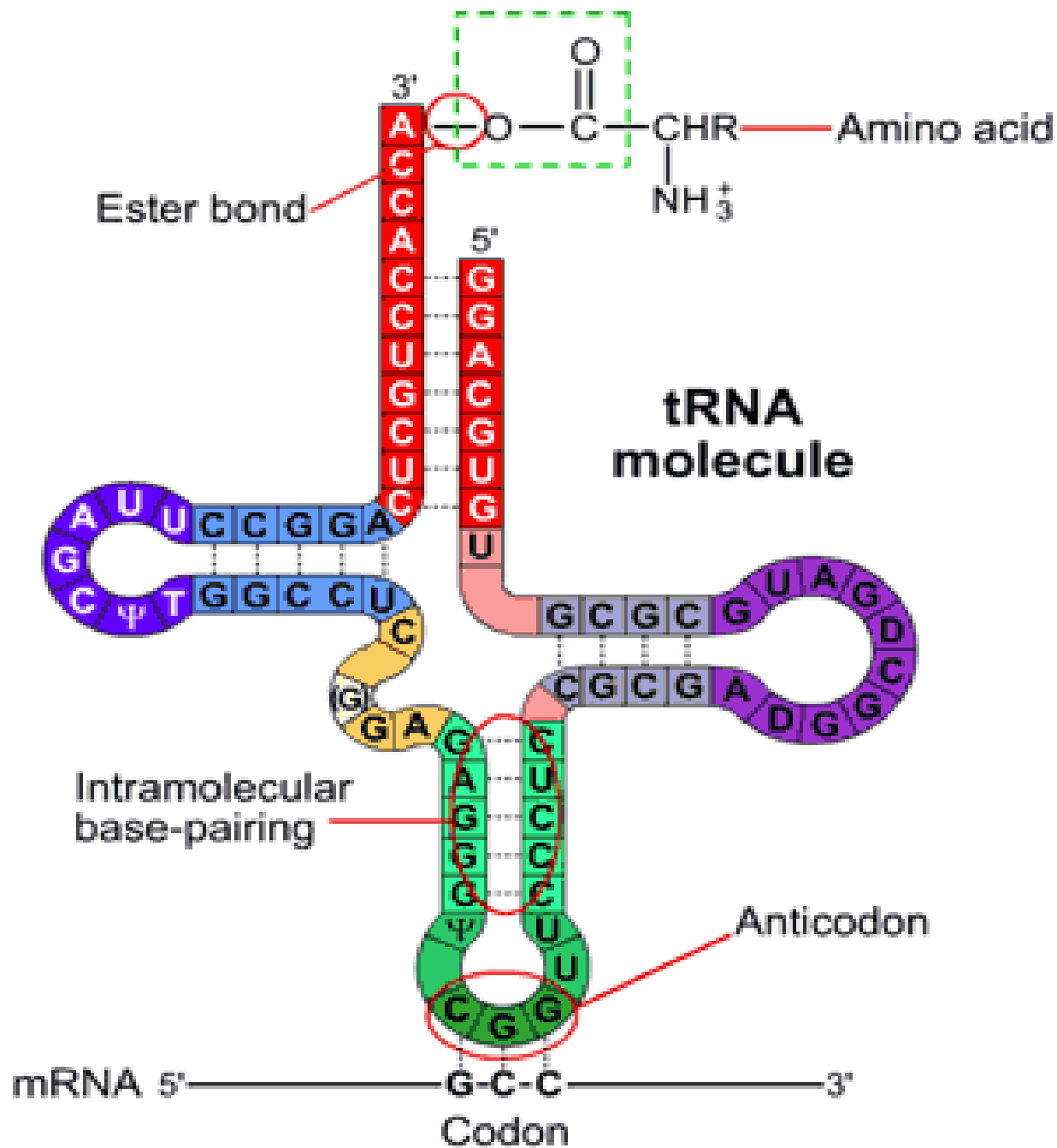


- tRNA

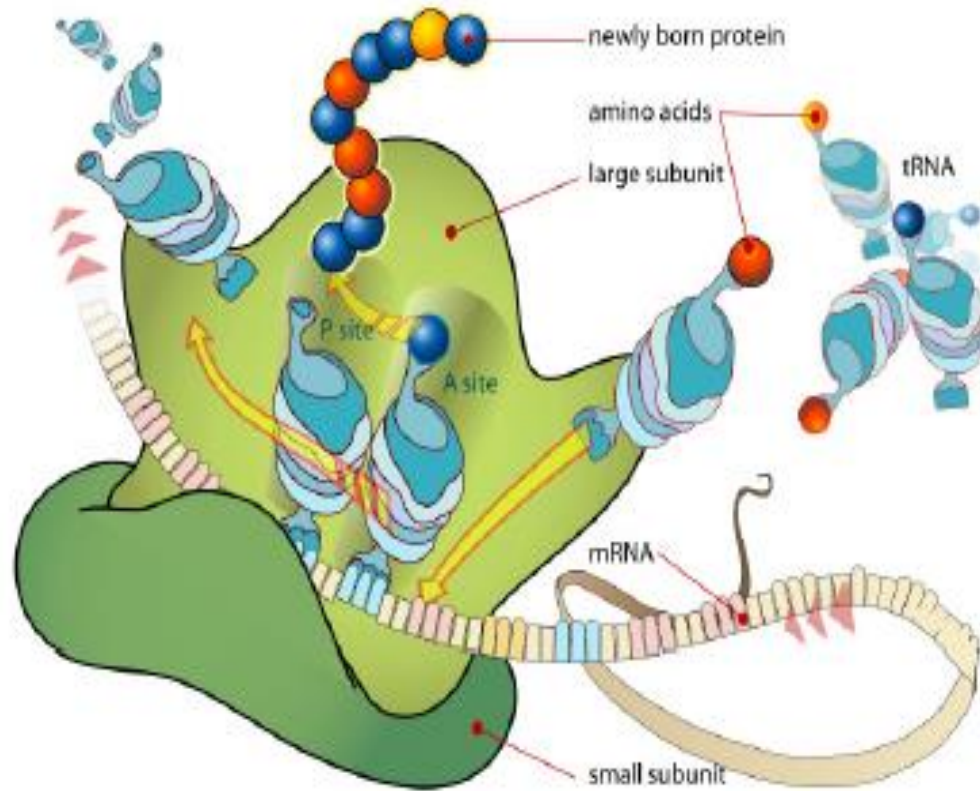
- Structure:

- single strand of nucleotides that is looped back on itself allowing some of the bases to pair with each other
 - On one end of the molecule there's an area called the anticodon, which consists of three bases that are complementary to the codon on the mRNA strand
 - The other end of the molecule attaches to an amino acid





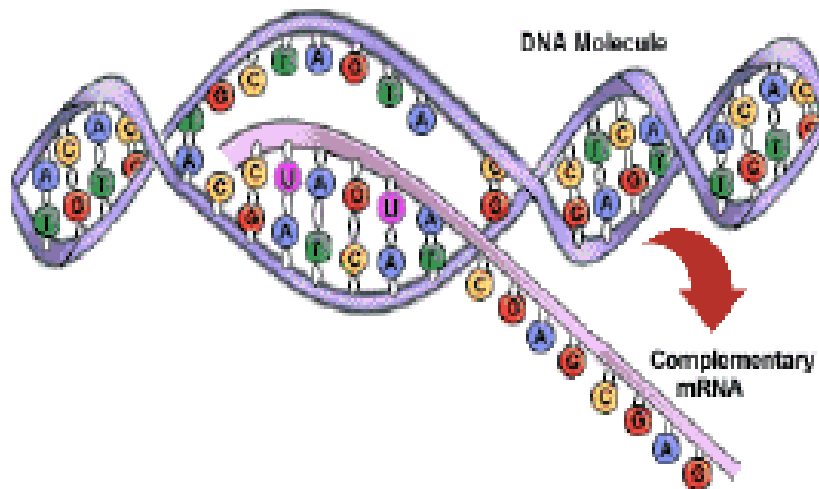
- Function: selects amino acids, transports them to the ribosome, and holds them in place for incorporation into a protein



- mRNA

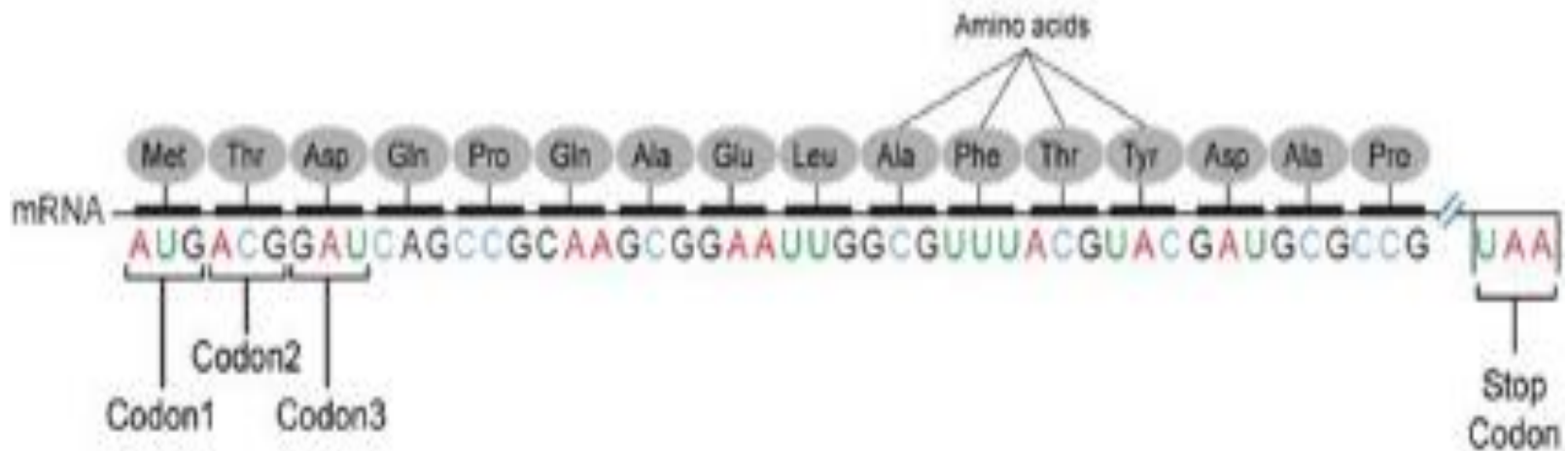
- Structure

- Single strand of nucleotides
 - Each set of 3 bases is called a codon



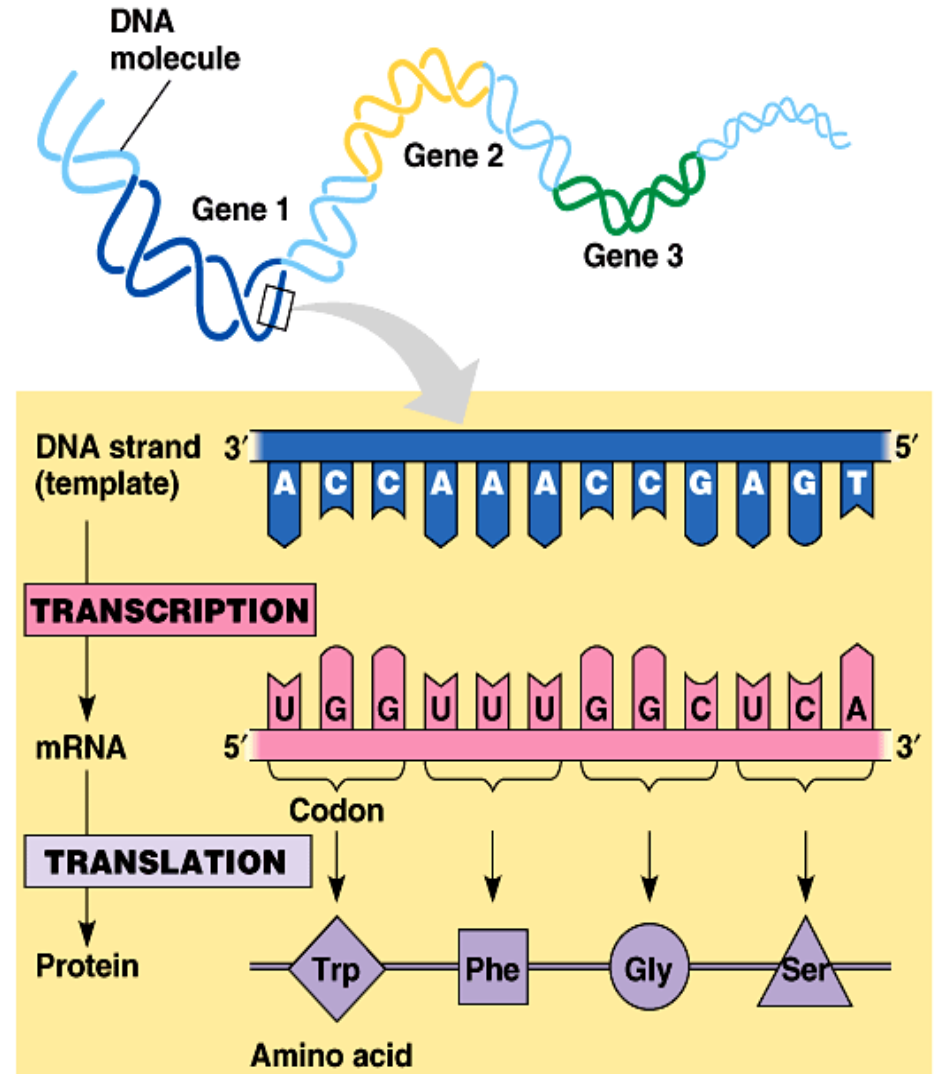
- Function

- Carries message from DNA (in the nucleus) to the ribosomes (in the cytoplasm)
- Each codon represents instructions for the addition of a specific amino acid (remember that amino acids are the building blocks of proteins)

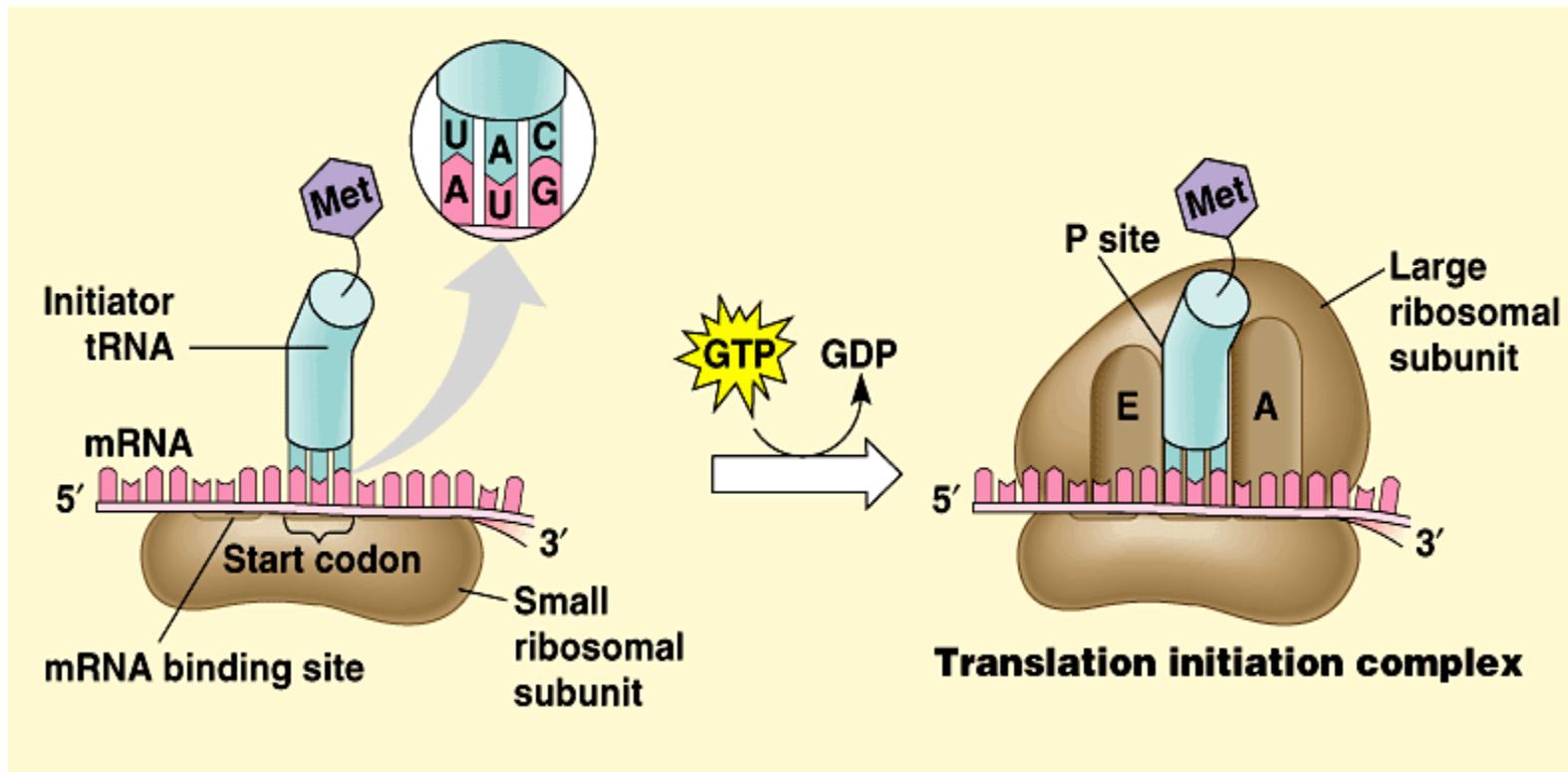


Translation

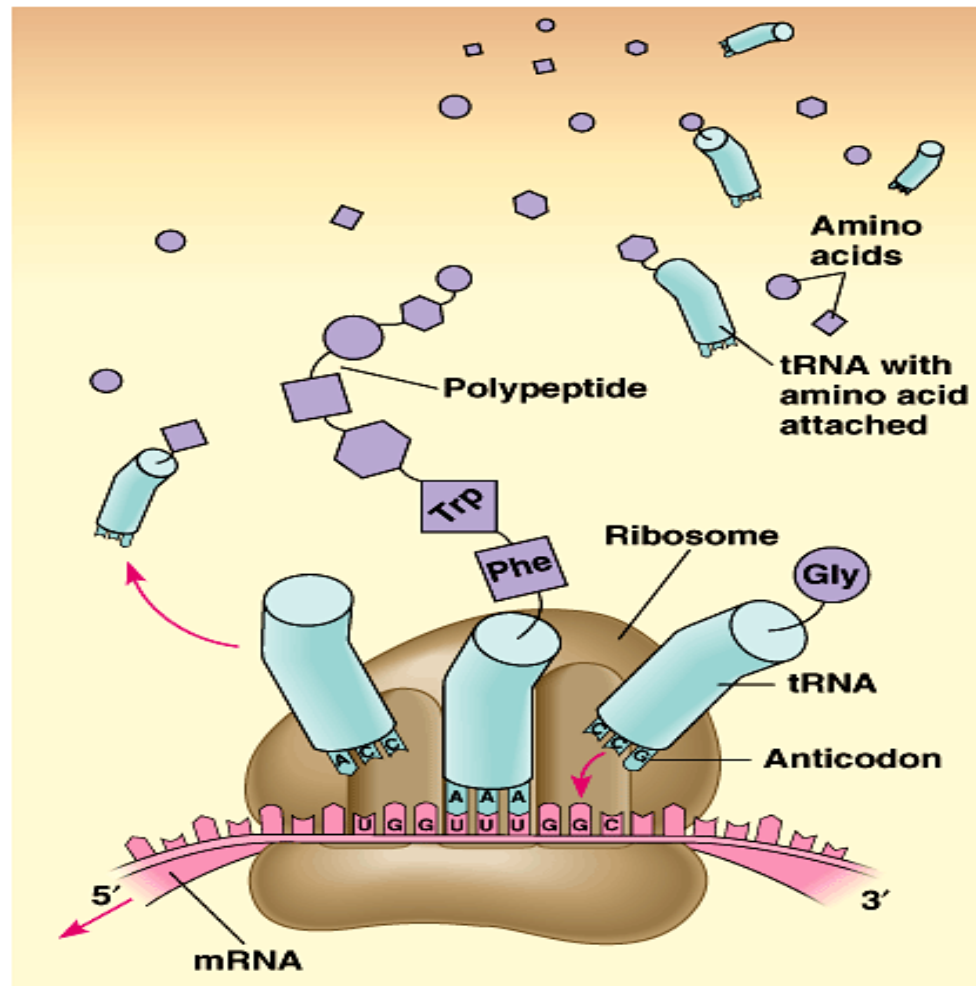
- During translation, the message in mRNA (nucleotides) is “translated” into a protein (amino acids)



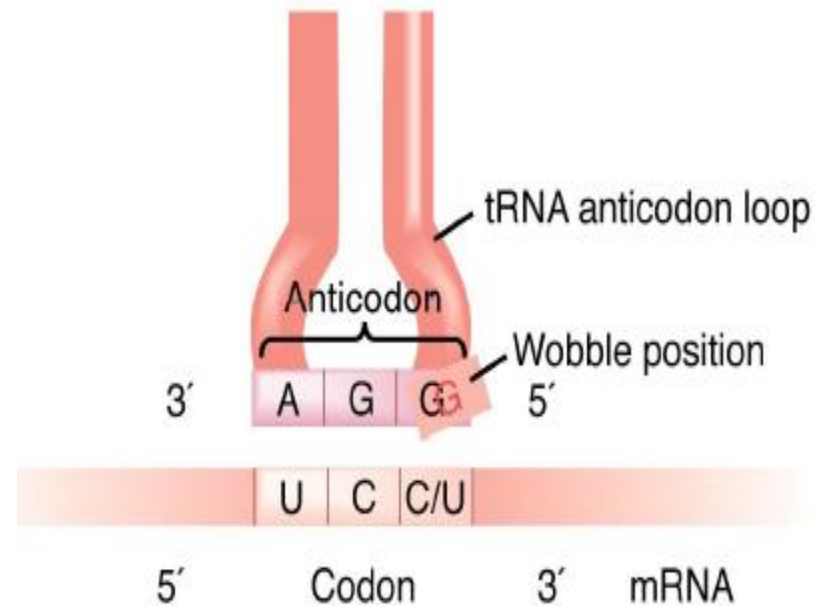
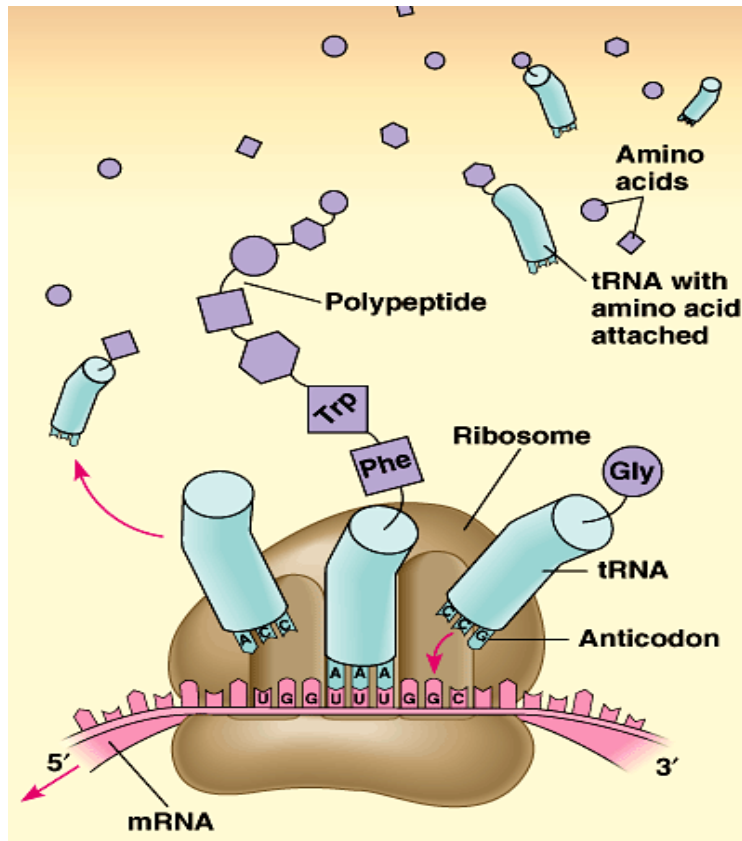
- The ribosome surrounds the mRNA strand (like a hamburger bun surrounds the burger)



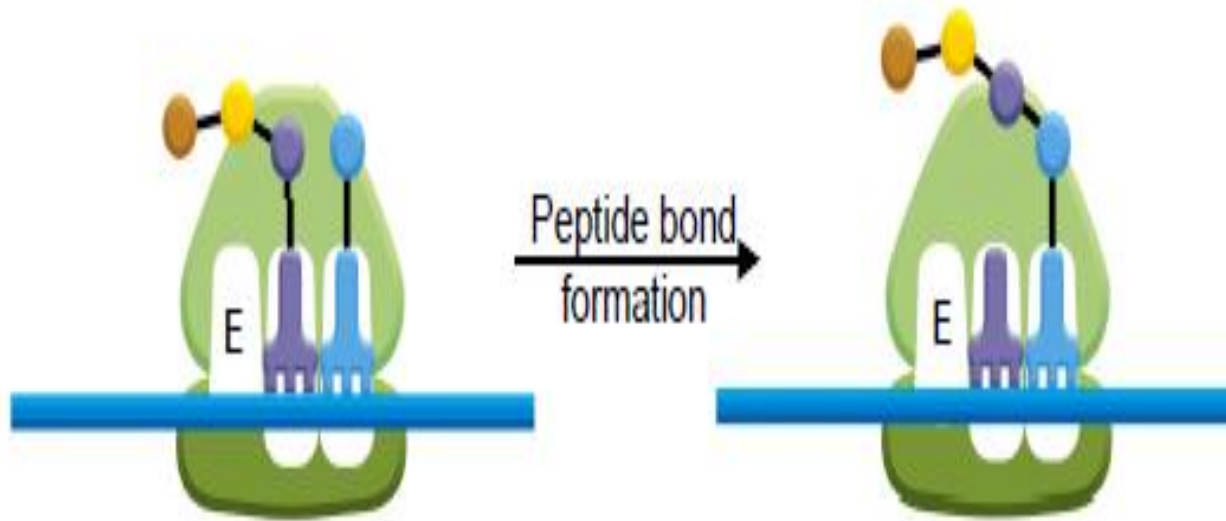
- The ribosome reads the mRNA codons one at a time.



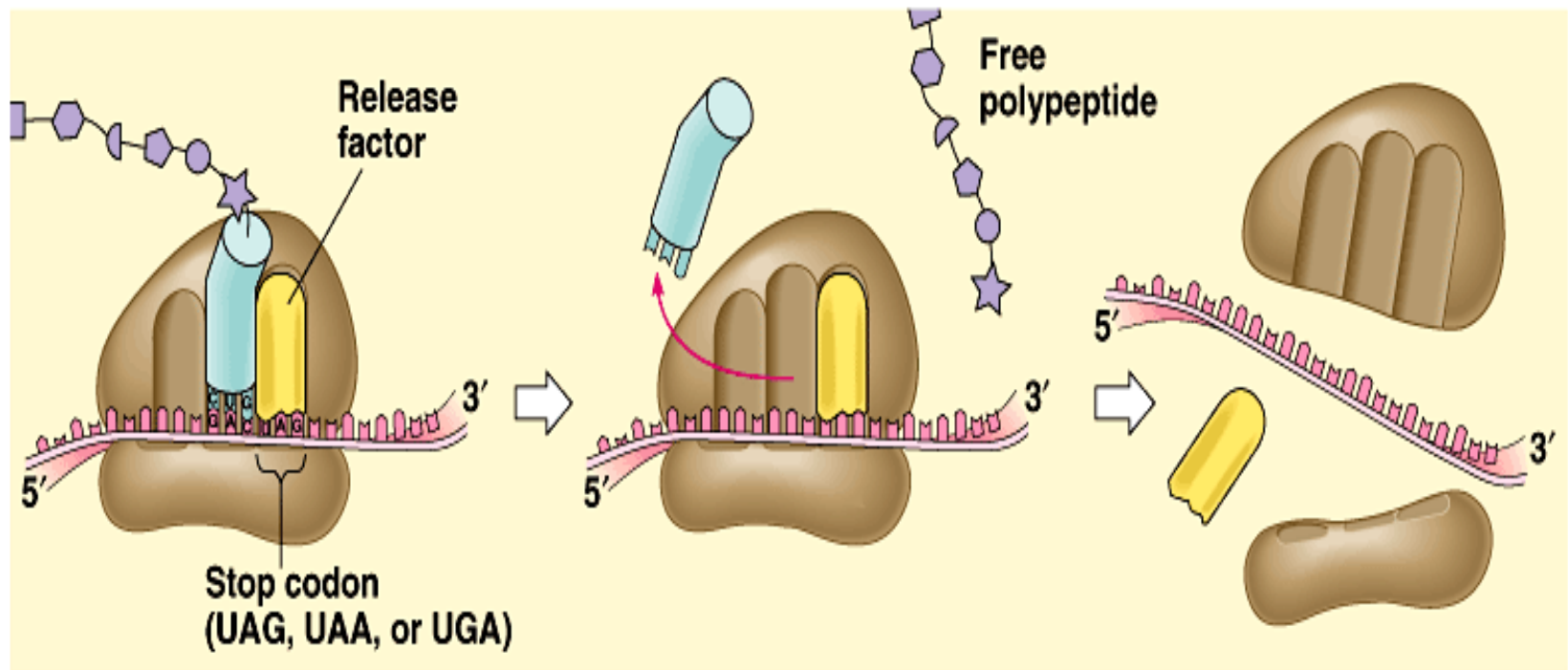
- tRNA molecules travel to the ribosome and add their amino acids to the growing polypeptide
 - The tRNA anticodons are complementary to the mRNA codons being read by the ribosome



- Remember that amino acids are linked together with peptide bonds. This is why proteins are called polypeptides.



- When translation is complete the polypeptide is released

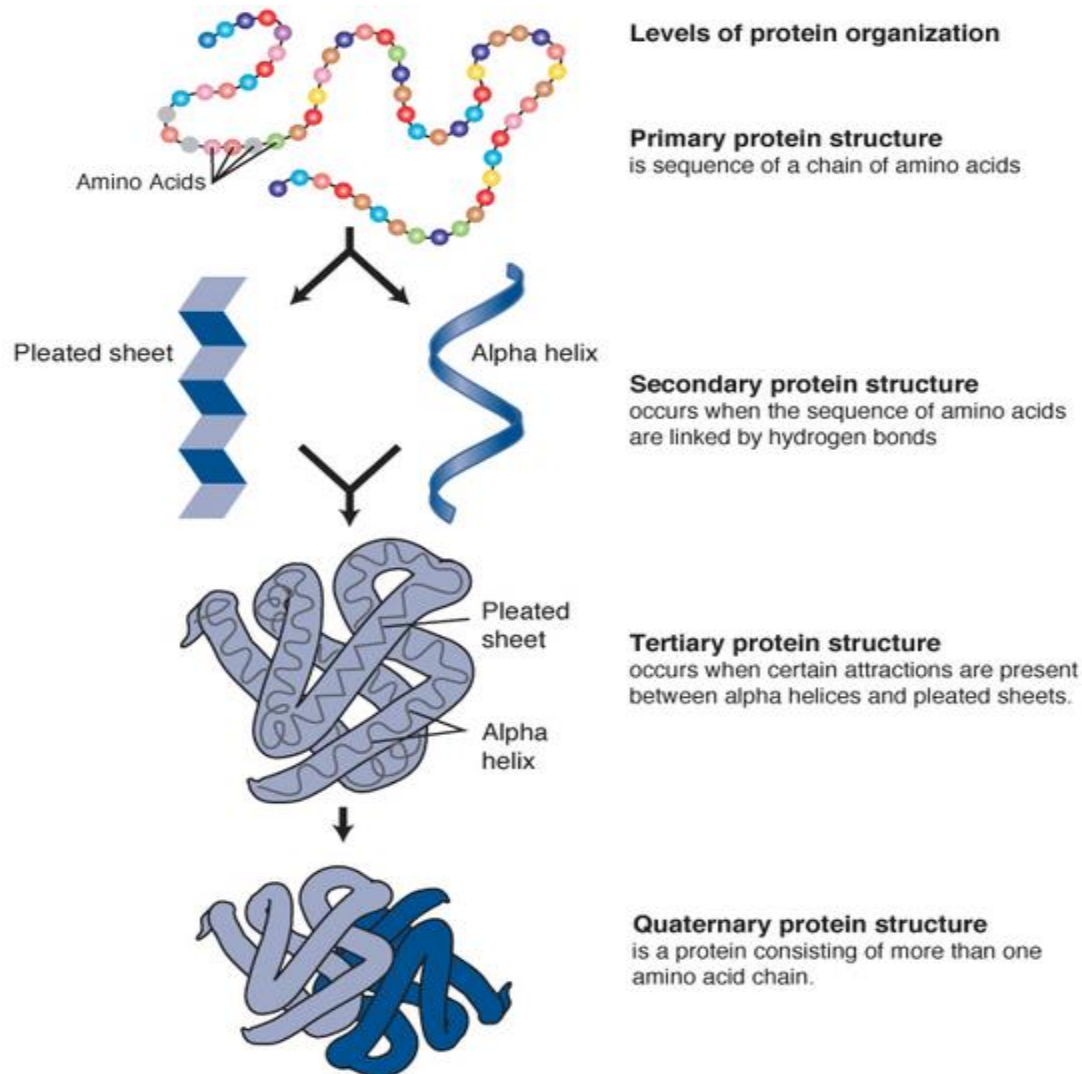


1

2

3

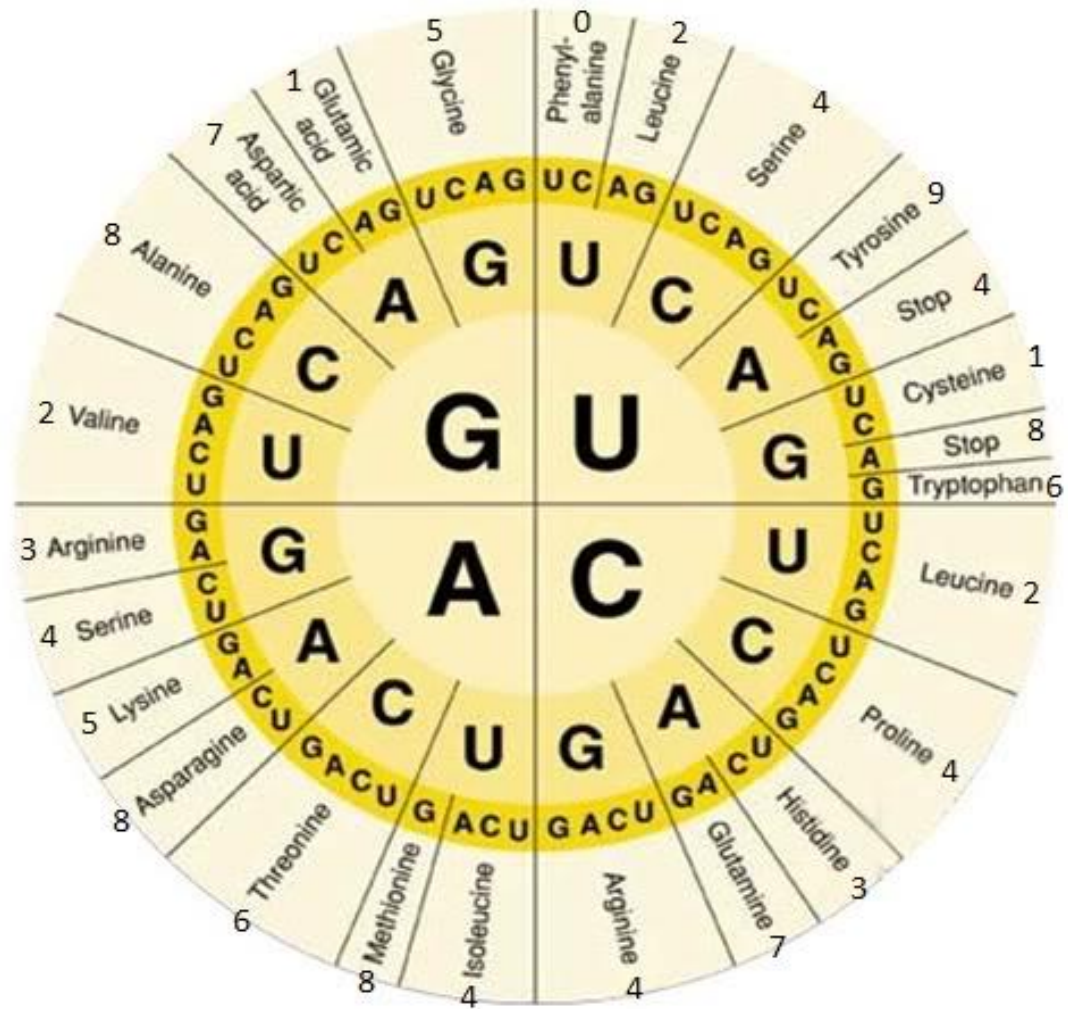
- Once the polypeptide is released it folds into a specific shape for a specific function



The Genetic Code

- The genetic code tells us what amino acids are represented by the different mRNA codons. There are 64 different combinations of bases (codons), and only 20 different amino acids, so several different codons can code for the same amino acid.

		Second base							
		U	C	A	G				
First base (5' end)	U	UUU	UCU UCC UCA UCG	Ser	UAU	UGU UGC UGA UGG	Cys	U	
		UUC			UAC			Tyr	C
		UUA			UAA Stop			UGA Stop	A
		UUG			UAG Stop			UGG Trp	G
	C	CUU	CCU CCC CCA CCG	Pro	CAU	CGU CGC CGA CGG	Arg	U	
		CUC			CAC			His	C
		CUA			CAA			Gln	A
		CUG			CAG				G
	A	AUU	ACU ACC ACA ACG	Thr	AAU	AGU AGC AGA AGG	Ser	U	
		AUC			AAC			Asn	C
		AUA			AAA			Lys	A
		AUG Met or start			AAG				G
	G	GUU	GCU GCC GCA GCG	Ala	GAU	GGU GGC GGA GGG	Gly	U	
		GUC			GAC			Asp	C
		GUA			GAA			Glu	A
		GUG			GAG				G



The Big Picture

