

12.3 DNA, RNA, and Protein

Central Dogma

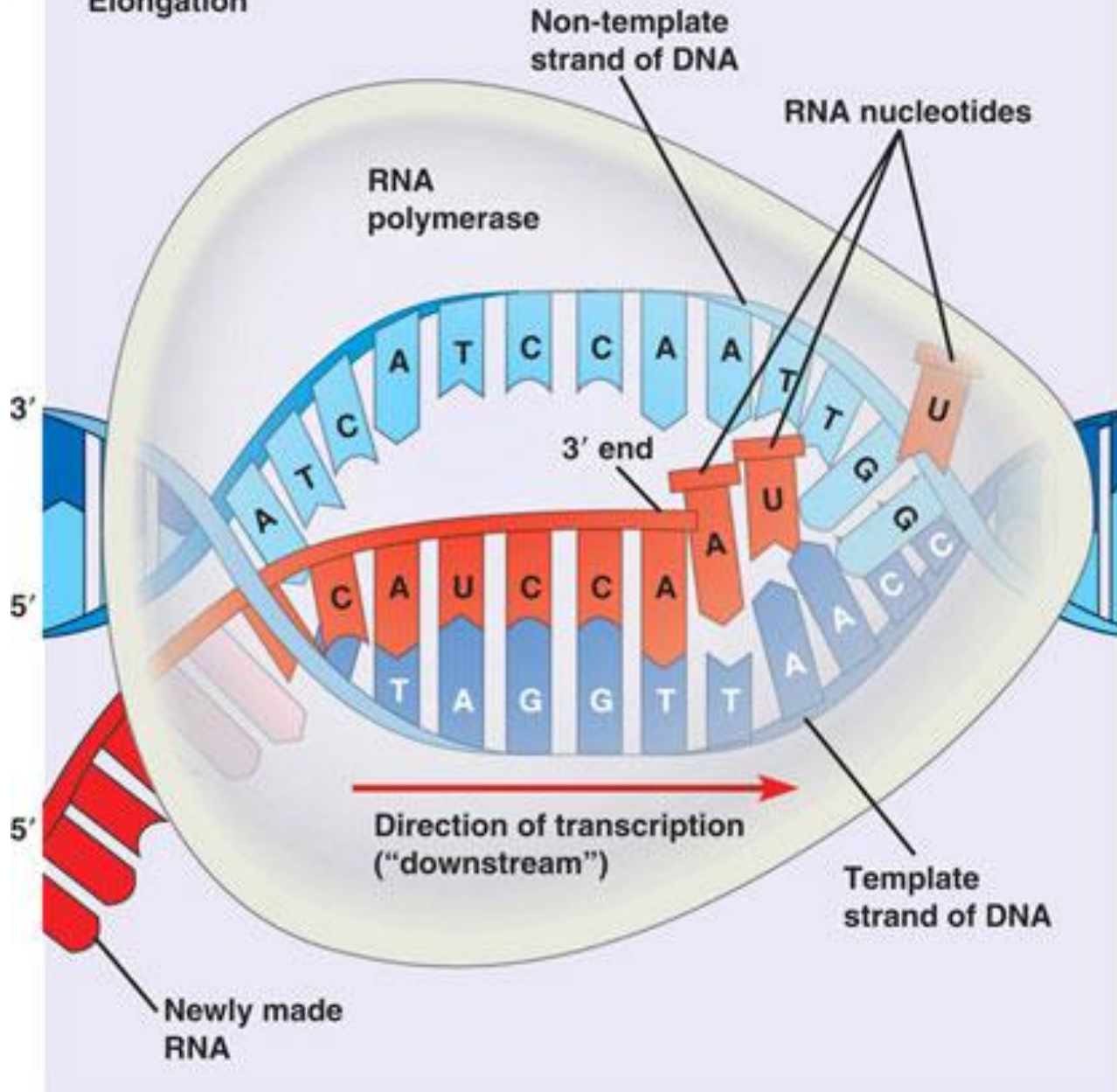
Central Dogma

DNA → mRNA → ribosome
(rRNA) → tRNA brings amino
acid → polypeptide gets made

Transcription Steps:

1. RNA polymerase unzips the DNA
2. RNA polymerase lays down the proper nucleotides on the DNA template (just one side -- coding or sense strand) in 5' → 3' direction
3. The other side (non-coding or nonsense strand) just waits patiently

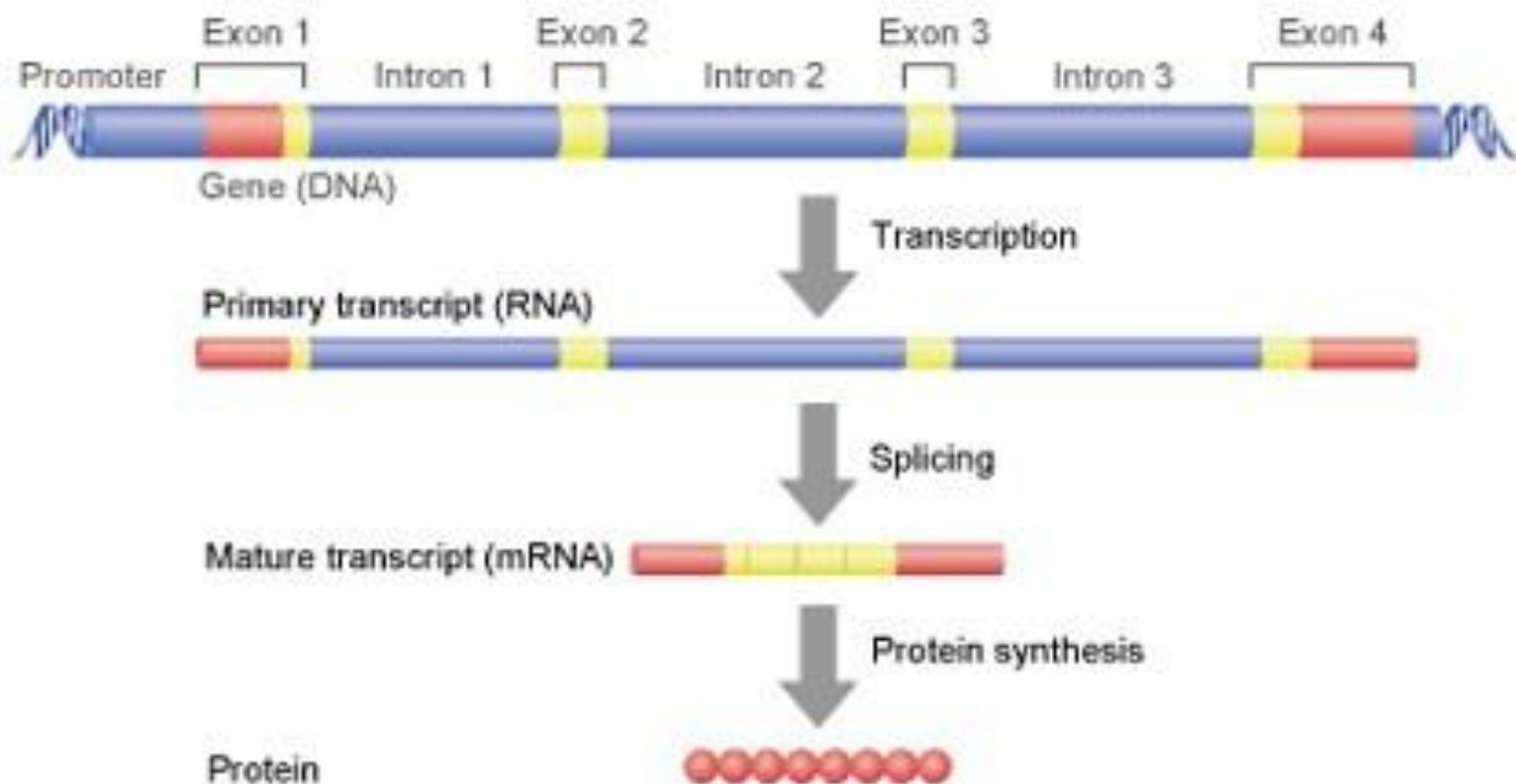
Elongation

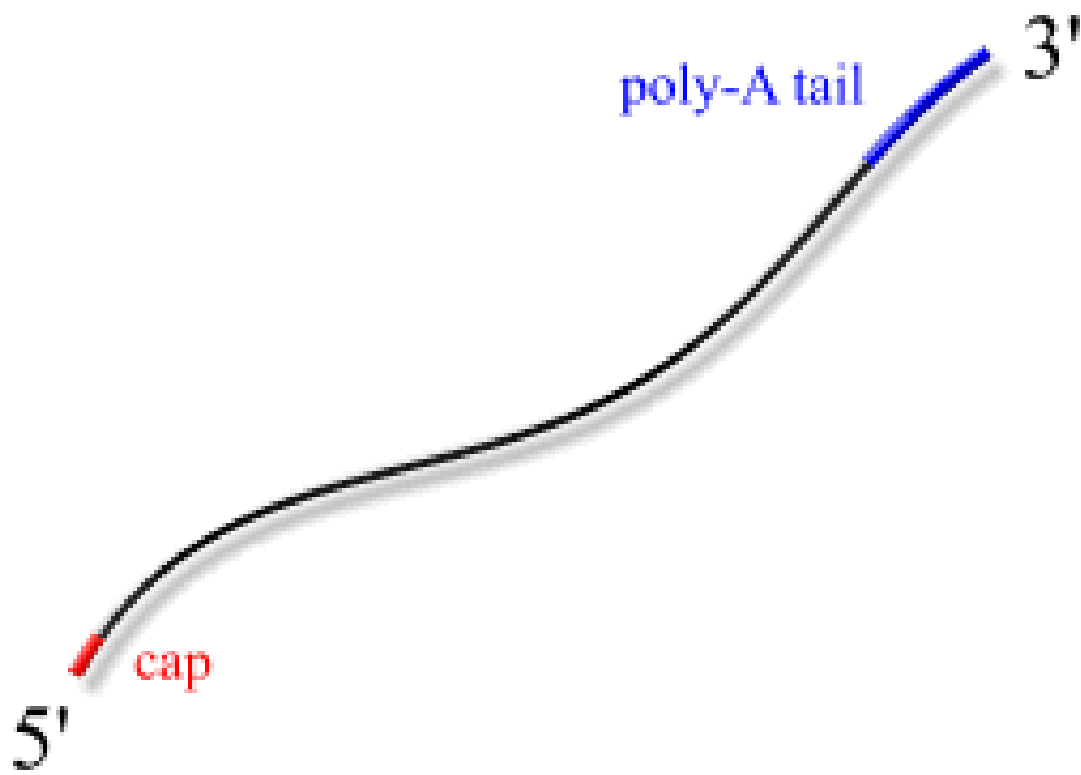


Processing steps:

1. Introns (**I**nterruptions) must be cut out
2. Exons (**E**xpressed) are left in and must be spliced together
3. 3' end gets a poly-A tail for protection
4. 5' end gets an mG cap

Structure of a Gene





Translation steps:

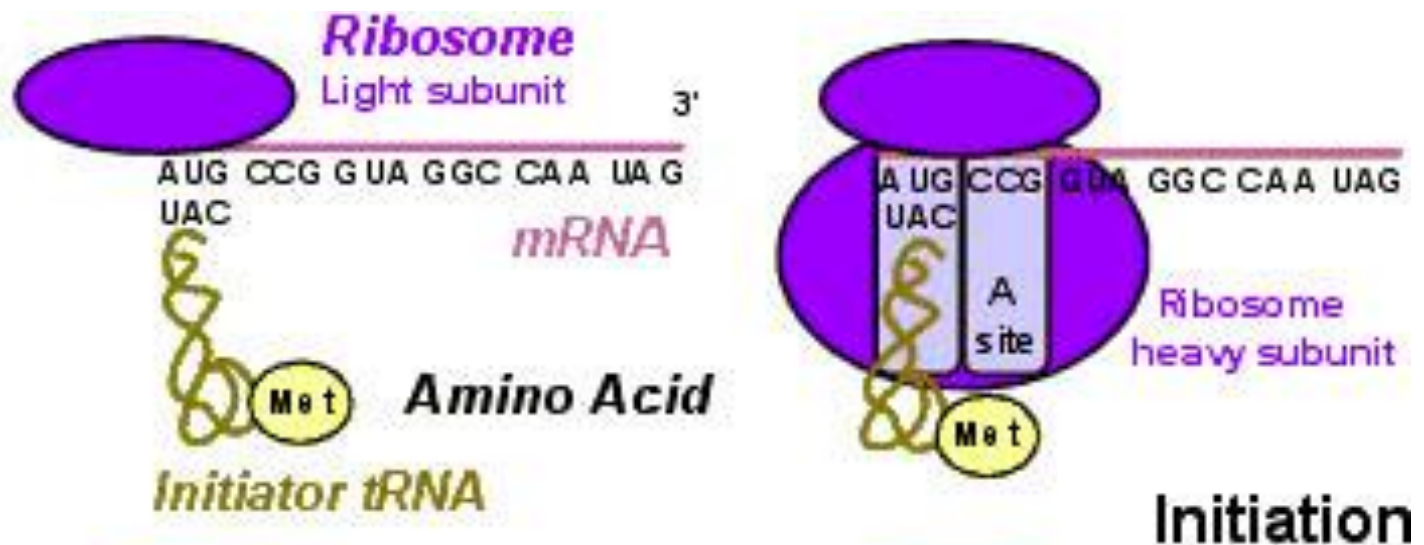
1. mRNA goes to ribosome
(between 2 subunits) to the A site
2. Start codon is read (AUG)
3. tRNA brings a methionine to
ribosome



UAG—UGA...UAA

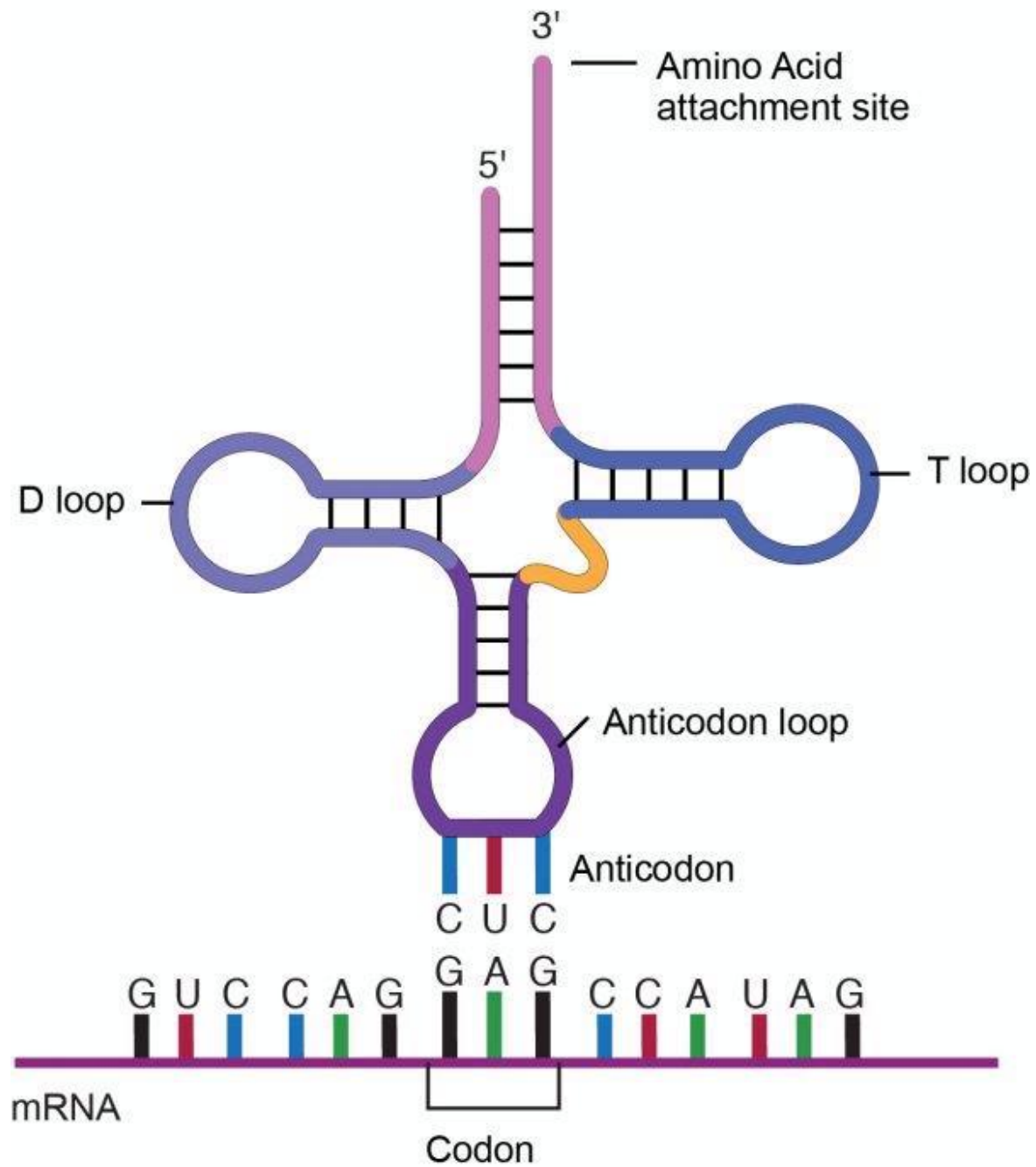
UAG—UGA...UAA

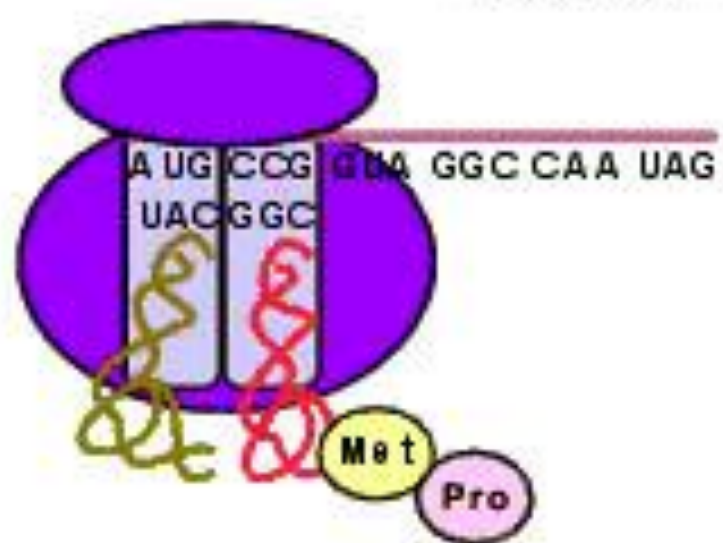
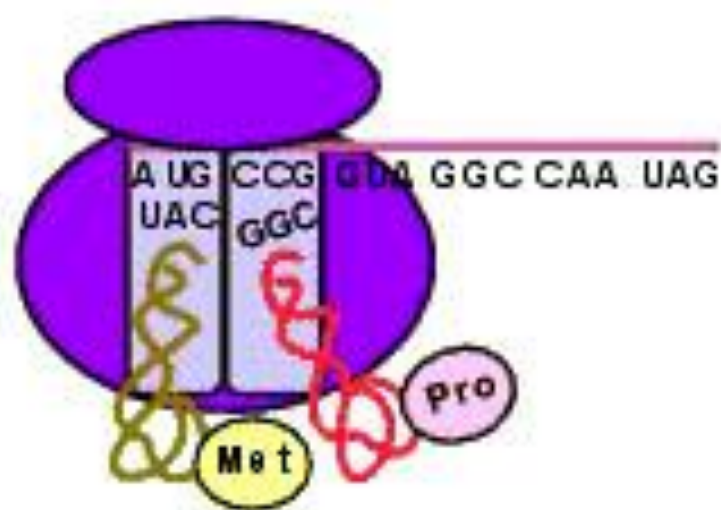
Initiation



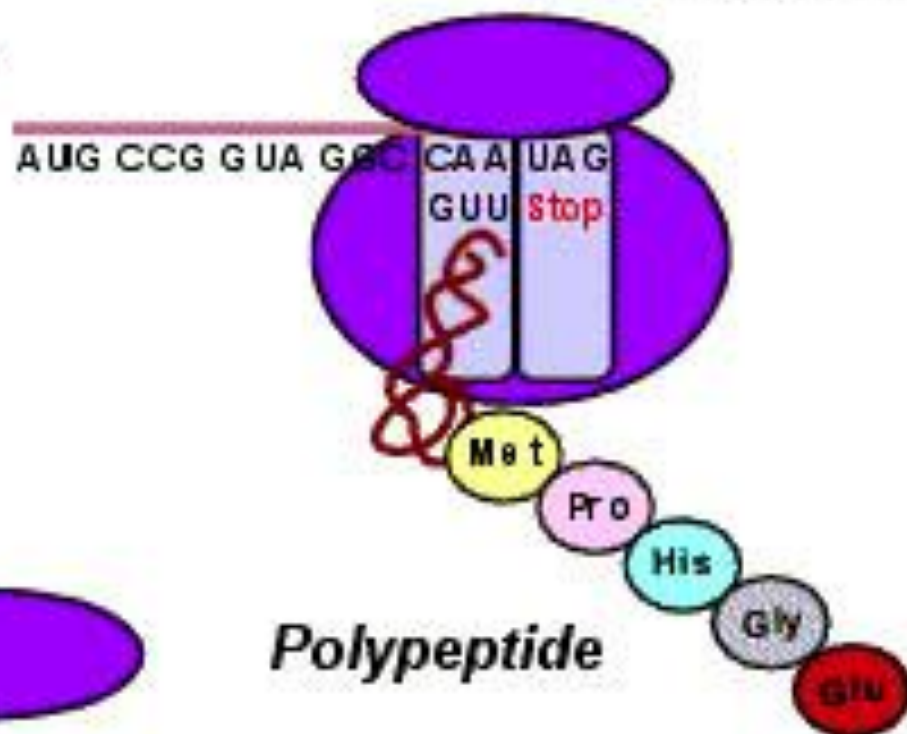
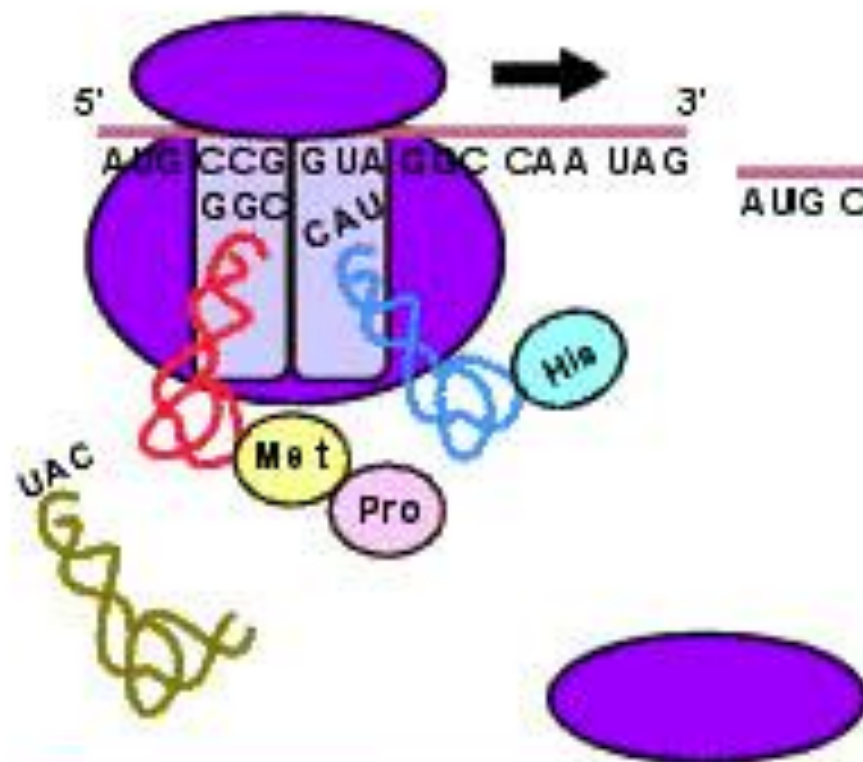
4. tRNA with 'met' moves over to the P site (and flips)
5. Next codon is read and the amino acid is brought by tRNA
6. Move to P site...flip...2 amino acids form a peptide bond
7. The first tRNA is released

tRNA





Elongation

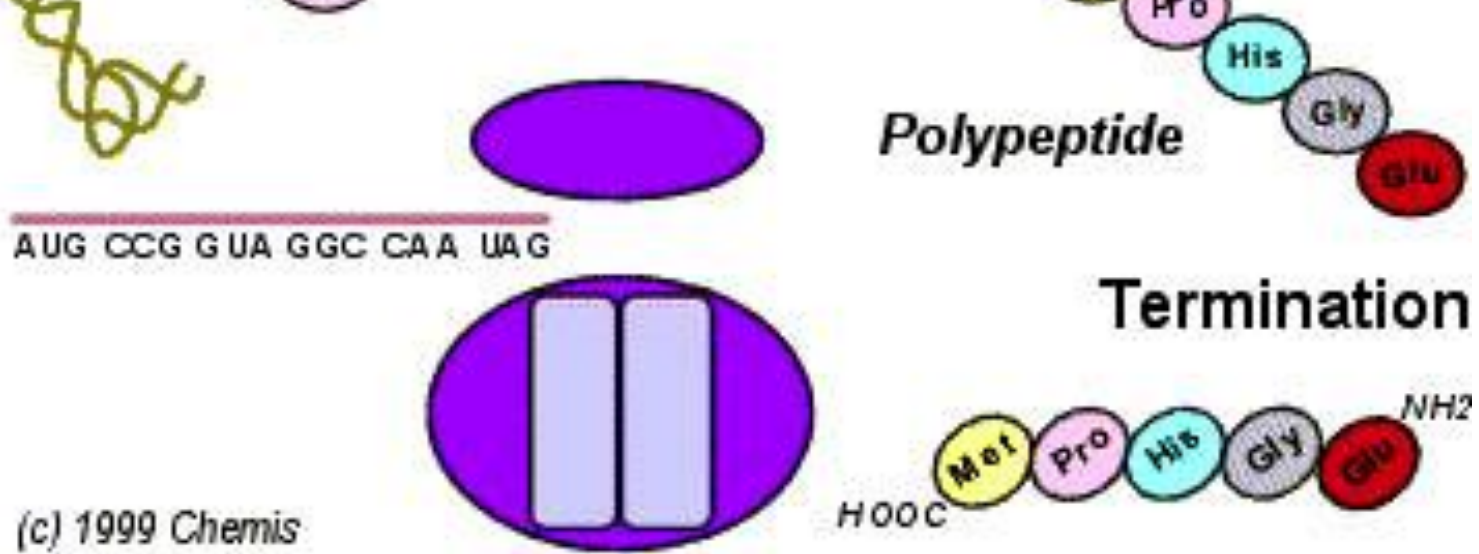


Polypeptide

AUG CCG GUA GGC CAA UAG

8. When the codon codes for STOP:
UAG, UGA, UAA—there is no amino acid with the tRNA

9. The tRNA moves to the P site and the polypeptide is released



- 10. The ribosome subunits disassemble
- 11. RNA molecules can be used over and over