

Translation:-

- Synthesis of proteins in cytoplasm
- Involves mRNA (codons)
tRNA (anticodons)
ribosomes
amino acid

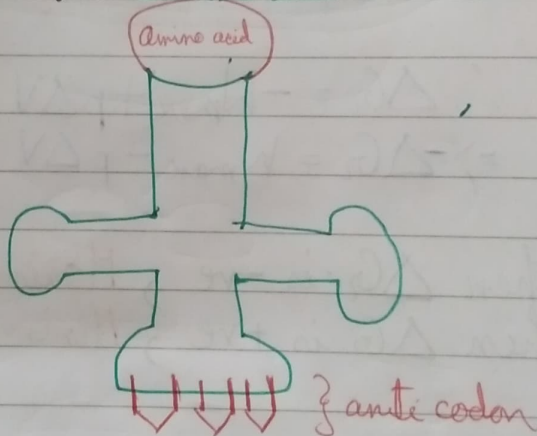
• Three steps in Translation:-

1. Initiation : start codon (AUG)
2. Elongation : amino acid links together
3. Termination : stop codon (UAA, UGA, UAG)

mRNA → codons of mRNA tells which tRNA it needs for releasing the amino acid according to codon

tRNA → anticodon of tRNA binds with codon of mRNA to release the amino acid linked to tRNA

Structure of tRNA:-

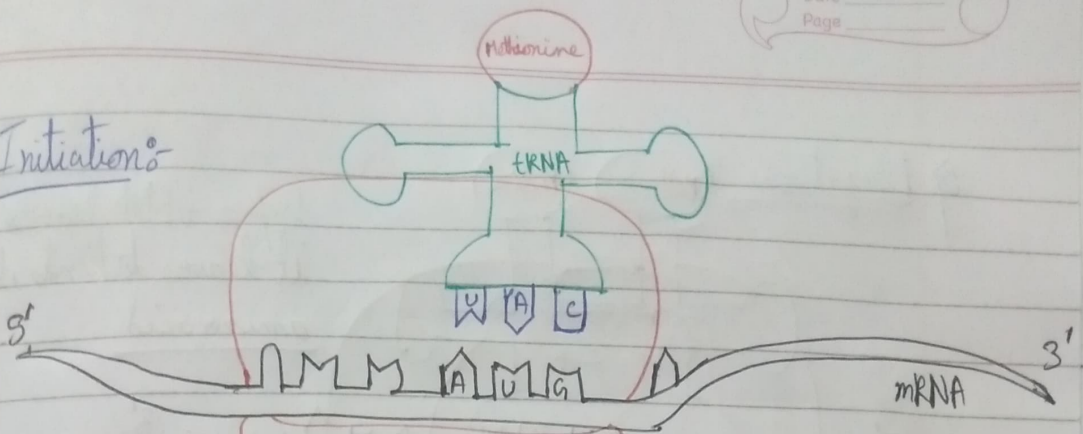


The tRNA with anti-codon complementary to codon of mRNA will bind and release that specific amino acid.
(pair with codon)

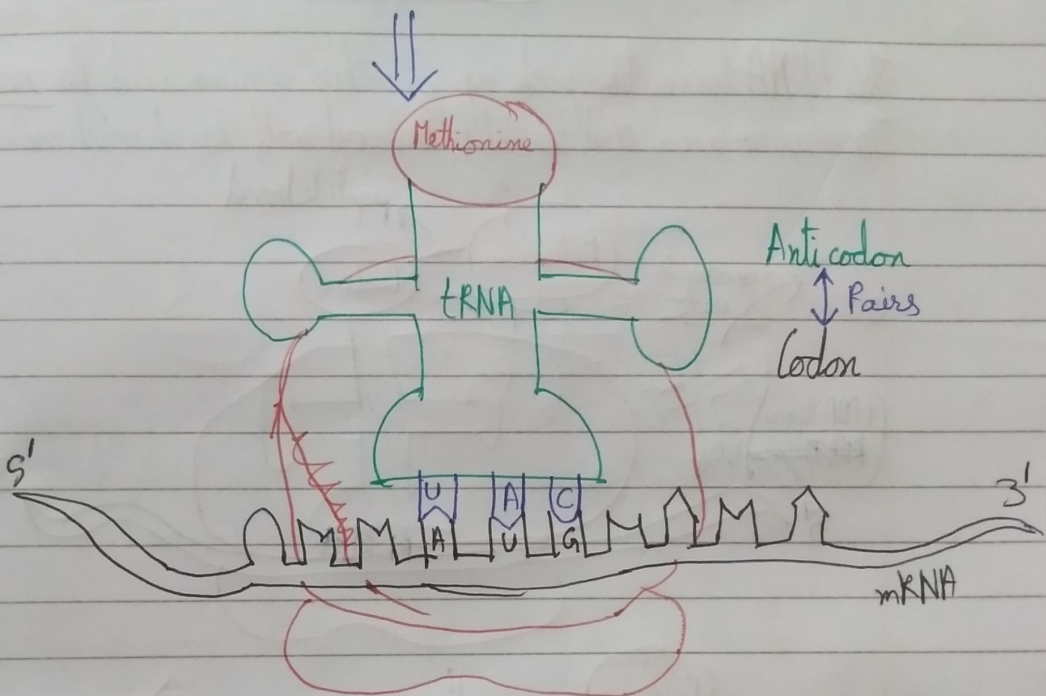
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There can be multiple ~~same~~ codons that code for same amino acid
However, there is only one codon that codes for methionine → AUG
Stop codons do not code for any amino acid
* They terminate translation process.

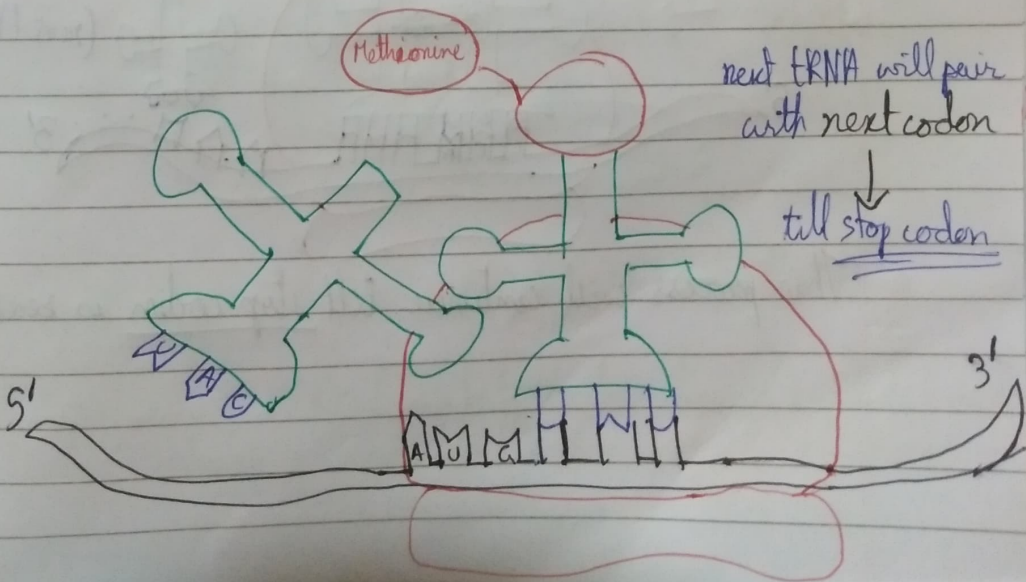
1) Initiation



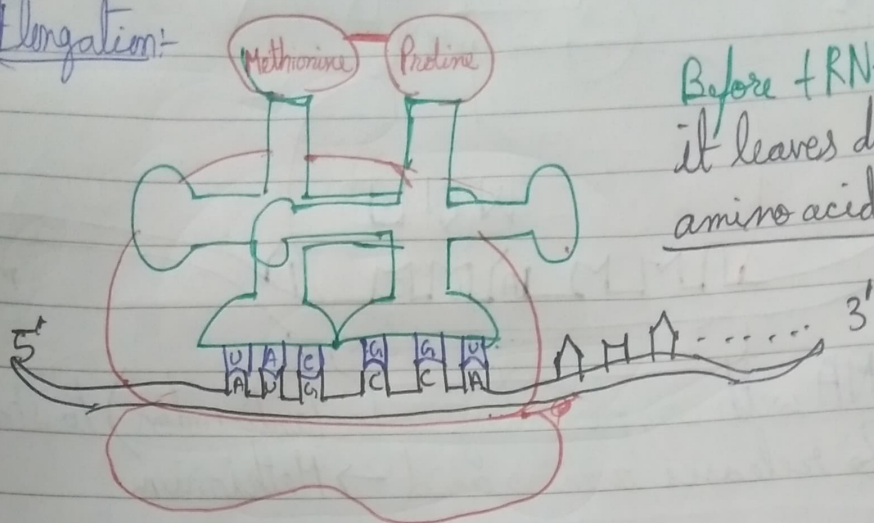
The tRNA with complementary codon (anti-codon) to start codon (AUG) pairs & releases amino acid → Methionine



The tRNA, after successful pairing will leave behind its amino acid Methionine and the next codon will be read

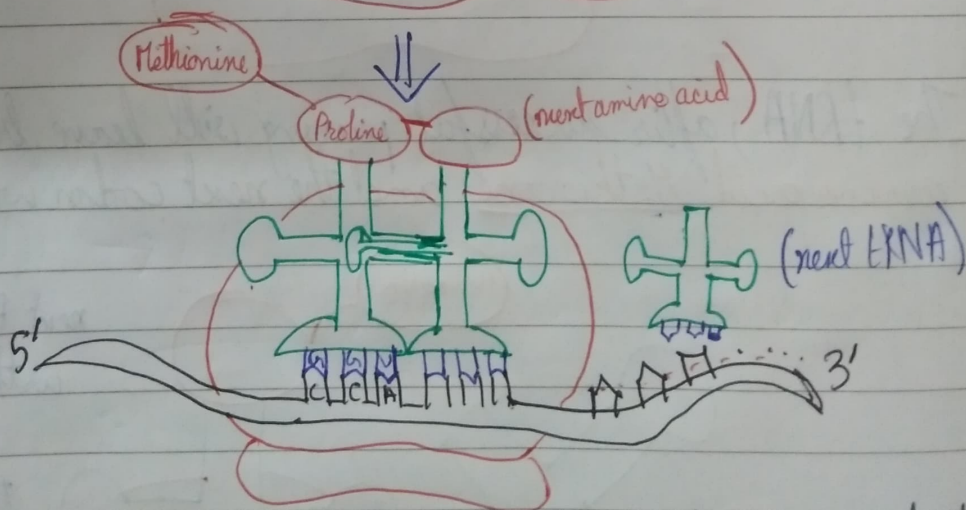
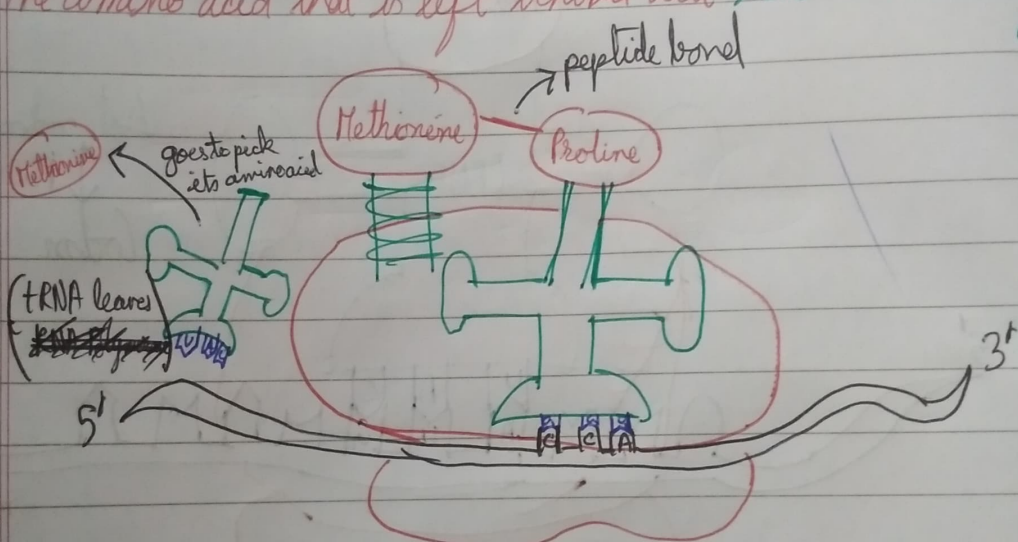


2) Elongation:-



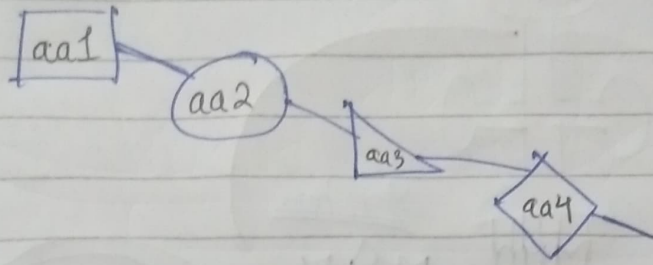
Before tRNA leaves, it leaves behind its amino acid

This tRNA leaves to pick up another amino acid for next time. The amino acid that is left behind will bind with next amino acid.

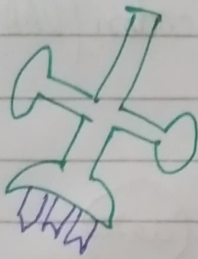


This process will continue till stop codon is reached

In this Elongation,



These amino acids are linked together by peptide bonds (fill stop codon)



The tRNA that leaves the site (Ribosome) will go pick up its amino acid in cytoplasm

The amino acid it had previously will be left behind.

* rRNA function:-

The site for Translation :- Free Ribosomes & Rough ER (in cytoplasm)

Proteins are Polymer of L- α -amino acids

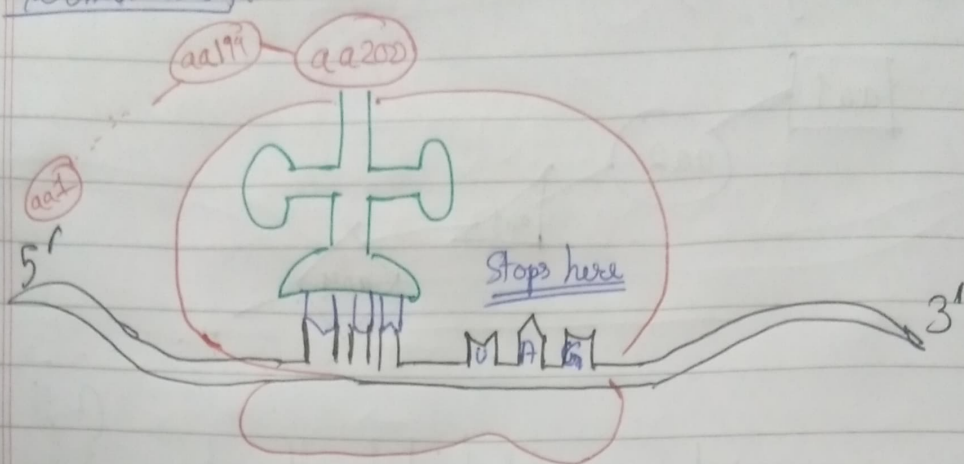
Amino acids \rightarrow Polypeptides \rightarrow Protein

During this translation process,
Polypeptide ^{is} ~~are~~ formed
chain

This chain is formed by help of rRNA

- Here, rRNA facilitates binding of tRNA(s) that bring specific amino acids.
- The ribosome's rRNA catalyzes formation of peptide bonds between amino acids to form polypeptide chain

3) Termination:-

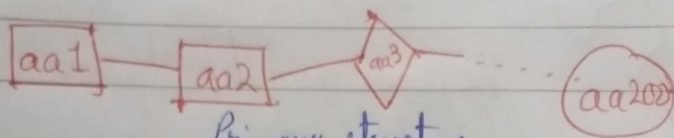


There is no tRNA for stop codon

No amino acid released for stop codon (UAA, UAG, UGA)

Translation ends here

End Product:-



Primary structure
of a protein

Hence, we have a sequence of amino acid bonded together by peptide bonds

This completed polypeptide chain is released

Next process:- Polypeptide chain later folds into functional protein

* rRNA → helps in linkage of amino acids
does not help in polypeptide chain synthesis

Summary:-

- 1) Initiation → starts translation
- 2) Elongation → rRNA helps in linking amino acids via peptide bond
- 3) Termination → Meets stop codon and ends translation