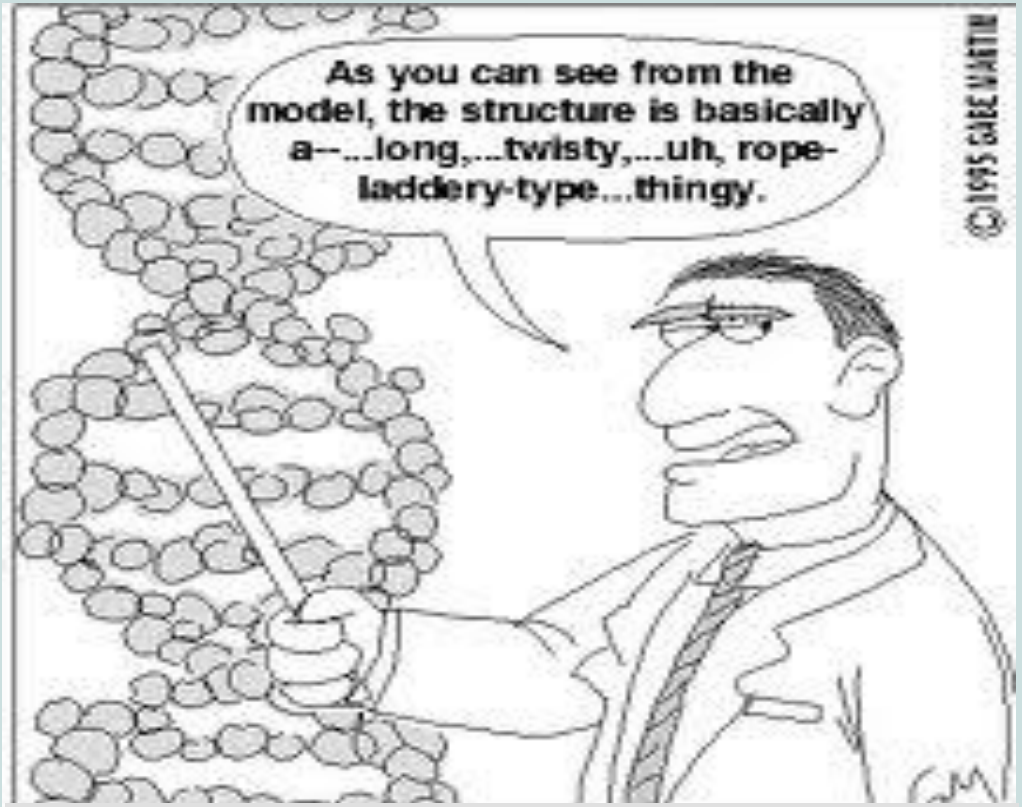
Tuesday 9/24



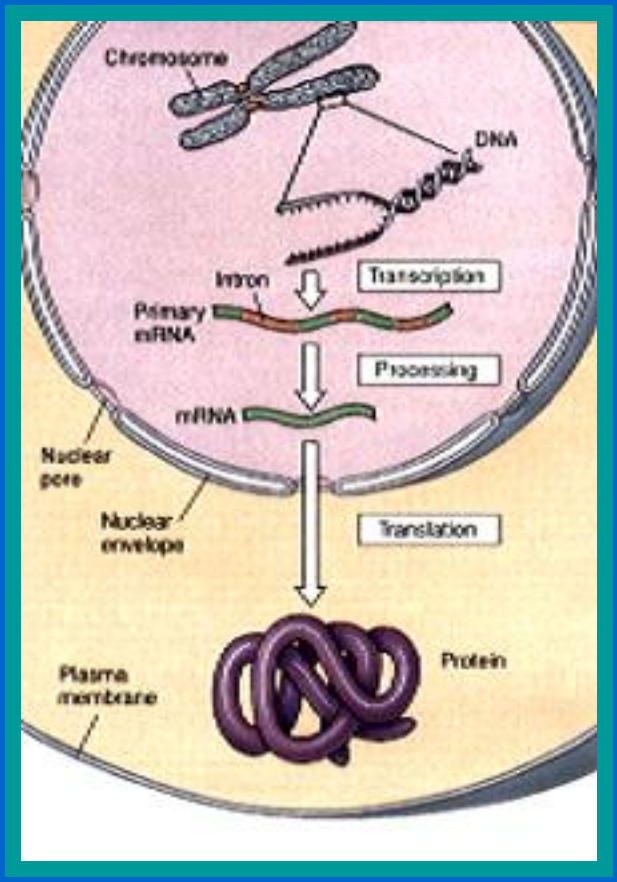
HOPE YOU WERENT THIS GUY

Protein Synthesis Quick Questions

What is RNA?

- When we talk about nucleic acids, we list two types: DNA and RNA, but what is RNA?
- Structure is a "cheap copy" of DNA
  - Bases A, G, C, U
    - Thymine is replaced with **Uracil** (A = U ≠ T)
  - Sugar is **ribose** not **deoxyribose** (less stable, takes less energy to make)

Protein Synthesis Quick Questions



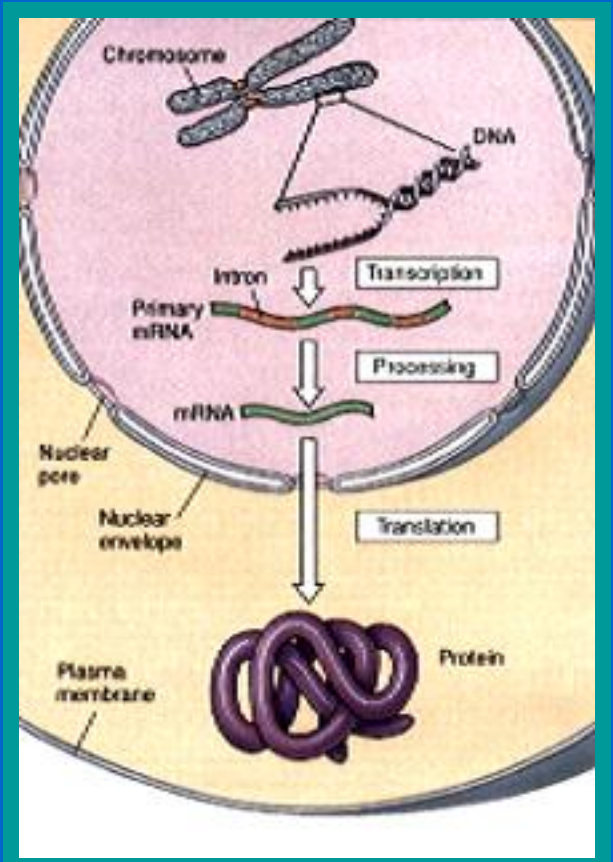
QQ#1:

Where is DNA stored and where does DNA replication take place?

QQ#2:

How do you think your body creates a protein?

What is Protein Synthesis?



Making Proteins in order to express genes from the genetic code.

Overview:

- DNA → RNA → Proteins

(in nucleus)

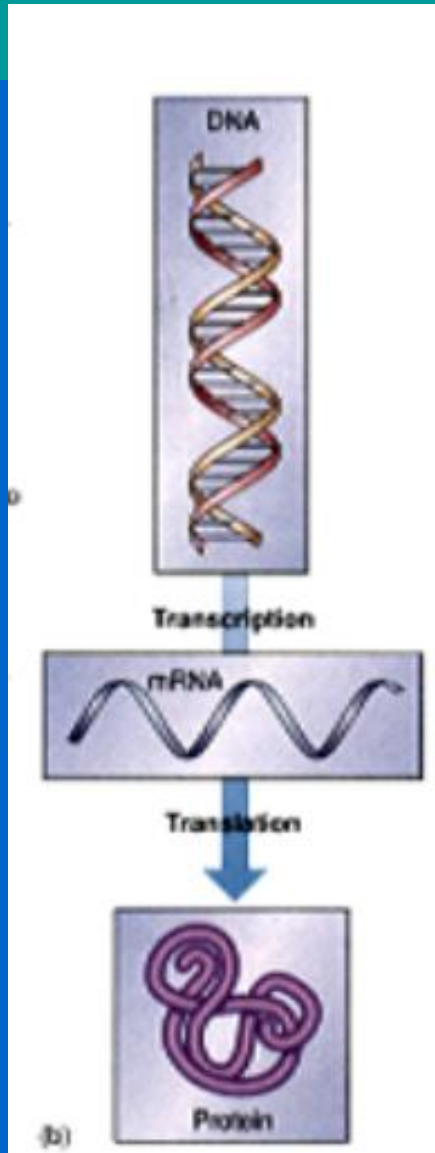
(in cytoplasm)

Why is Protein Synthesis Important?

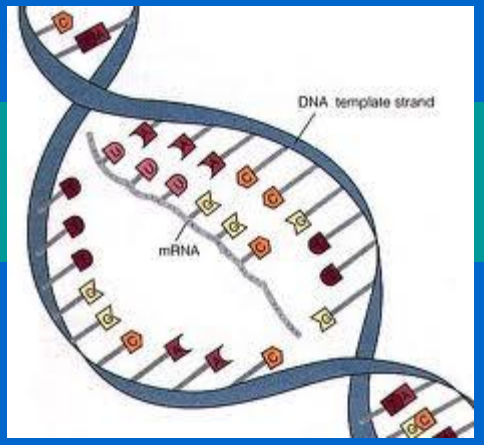
- **Gene Expression occurs Through Protein Synthesis**
  - Protein synthesis allows the genes we inherit to be expressed and make us look and function the way we do.

How Does Protein Synthesis/ Gene Expression Occur?

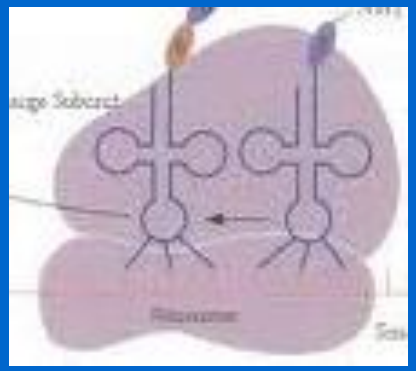
- Two Important Steps
  - **Step 1: Transcription**:
    - RNA synthesis from DNA
      - DNA → RNA
  - **Step 2: Translation**:
    - assembling protein from RNA
      - RNA → Proteins



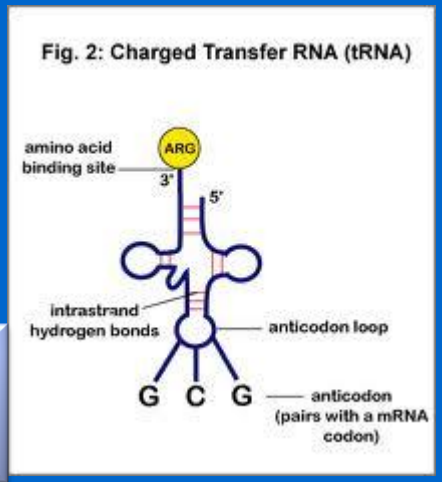
3 Types of RNA are used in Protein Synthesis



- mRNA – messenger RNA
  - carries copy of genetic instructions to the rest of the cell
  - the instructions tell the cell how to assemble the amino acids for making proteins



- rRNA – ribosomal RNA
  - makes up a part of ribosomes (which are the site for protein synthesis)

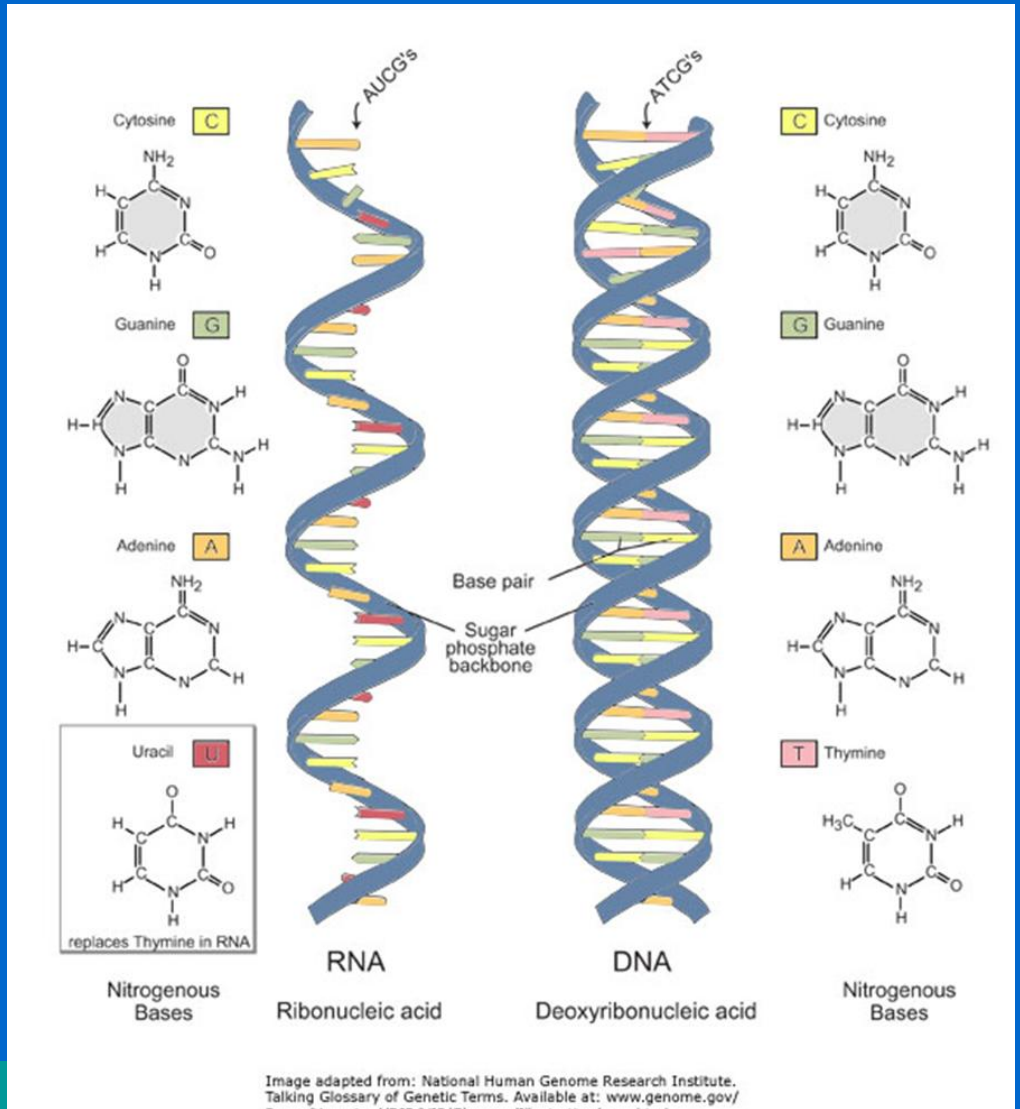


- tRNA – transfer RNA
  - transfers each amino acid to the ribosome as it is specified by the mRNA

- QQ#3: Copy the name, function and shape of the three types of RNA

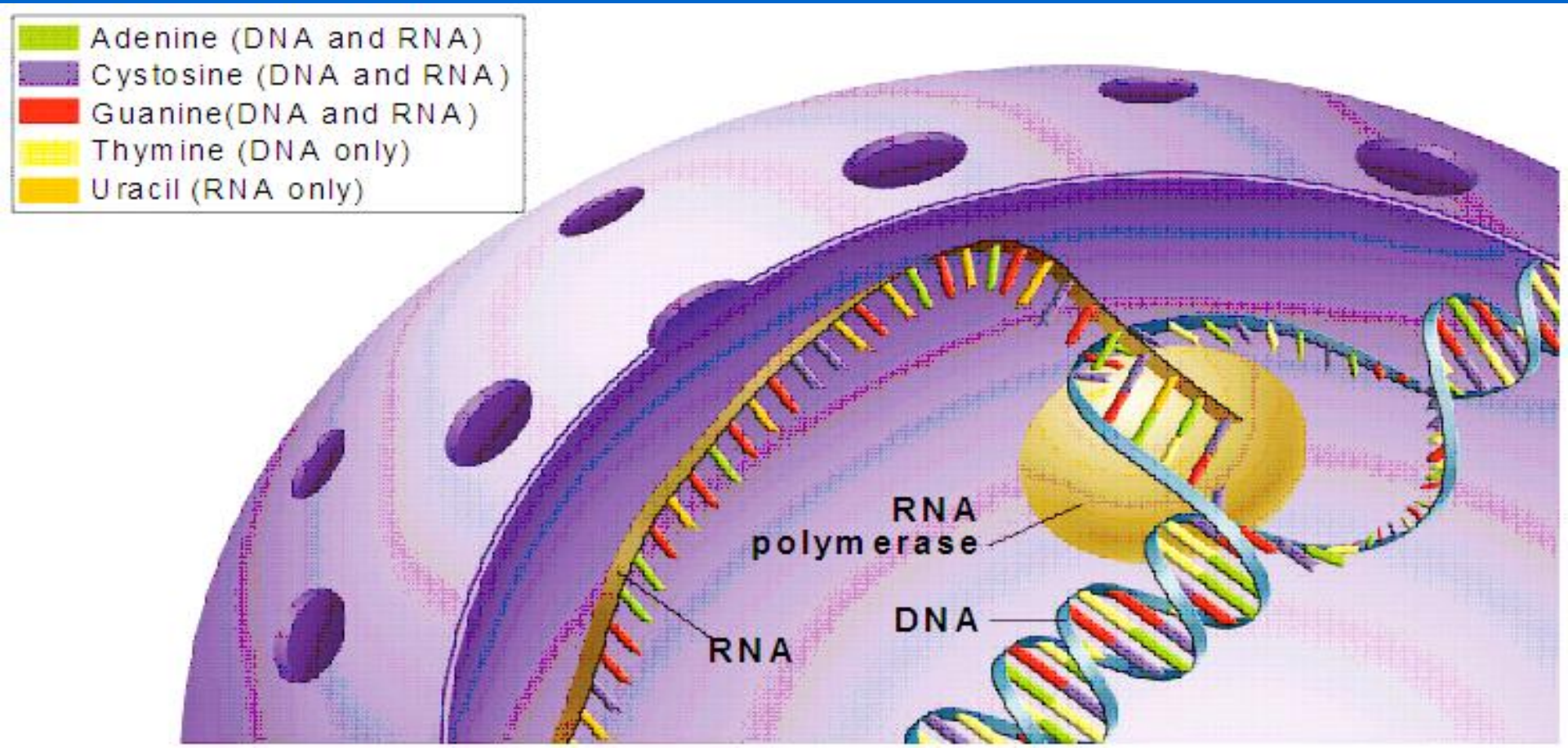
Step 1: Transcription

- Simply:
  - In the nucleus DNA → mRNA
  - This copy is used in step 2: translation



QQ#4: after watching the video-look at this picture and summarize what is happening

http://www.youtube.com/watch?v=ztPkv7wc3yU



Step 1: Transcription

- RNA polymerase (an enzyme) – binds to DNA and separates the 2 strands
- RNA polymerase then uses one strand of DNA as a template for assembling an mRNA complementary strand
- This creates a strand of mRNA which can carry the genetic code out of the nucleus to complete the second step of protein synthesis.

Step 2: Translation

- Simply:
  - mRNA→ polypeptide chain (protein)
  - mRNA is read in “codons” and is matched with tRNA antiocodons to link amino acids

How is the Amino Acid sequence determined?

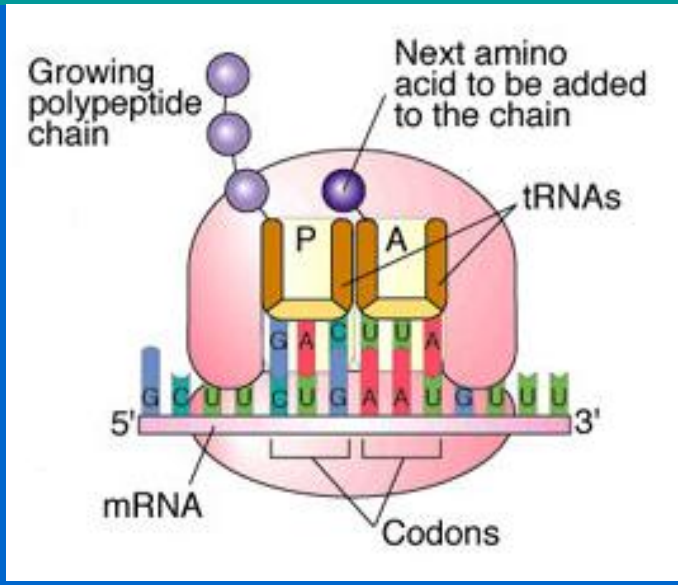
- mRNA read in codons (which are 3 nucleotides in a row on mRNA).
- 4 different bases: 4x4x4 = 64 possible codes/codons
- But, only 20 AA
- Each AA has more than one code

	U	C	A	G
U	UUU = phe UUC = phe UUA = leu UUG = leu	UCU = ser UCC = ser UCA = ser UCG = ser	UAU = tyr UAC = tyr UAA = stop UAG = stop	UGU = cys UGC = cys UGA = stop UGG = trp
C	CUU = leu CUC = leu CUA = leu CUG = leu	CCU = pro CCC = pro CCA = pro CCG = pro	CAU = his CAC = his CAA = gln CAG = gln	CGU = arg CGC = arg CGA = arg CGG = arg
A	AUU = ile AUC = ile AUA = ile AUG = met	ACU = thr ACC = thr ACA = thr ACG = thr	AAU = asn AAC = asn AAA = lys AAG = lys	AGU = ser AGC = ser AGA = arg AGG = arg
G	GUU = val GUC = val GUA = val GUG = val	GCU = ala GCC = ala GCA = ala GCG = ala	GAU = asp GAC = asp GAA = glu GAG = glu	GGU = gly GGC = gly GGA = gly GGG = gly

QQ#5: Give a quick recap of how to use the codon chart

Step 2: Translation Continued

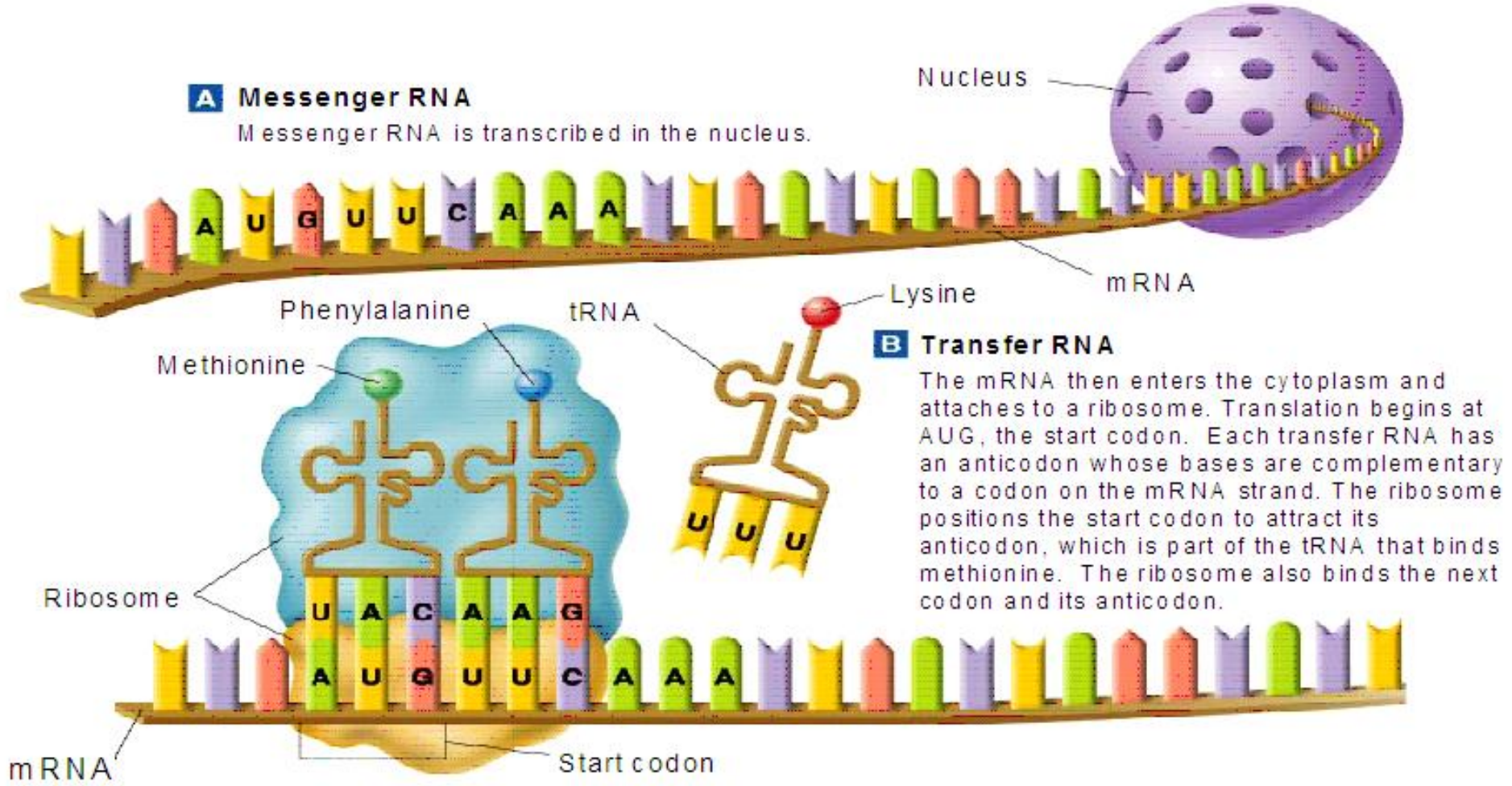
- Process
  1. mRNA leaves nucleus and enters cytoplasm
  2. ribosomes (rRNA) binds to start sequence (AUG) on mRNA
  3. mRNA is read by ribosome 3 nucleotides at a time (called codons)
  4. Each codon codes for a specific amino acid



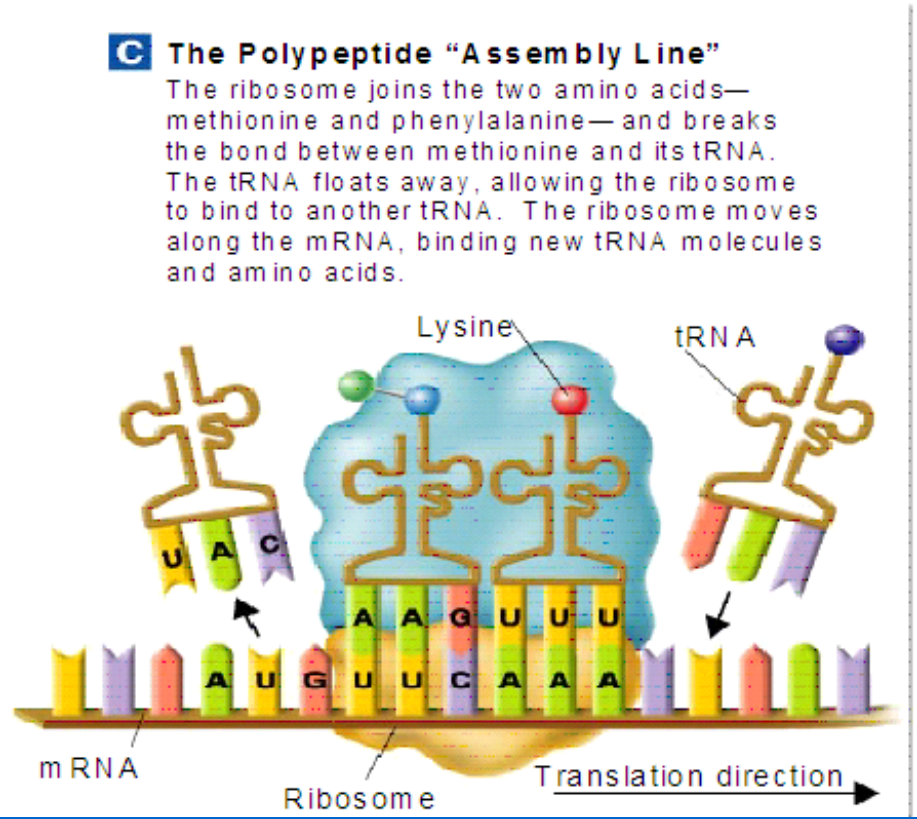
Step 2: Translation Continued

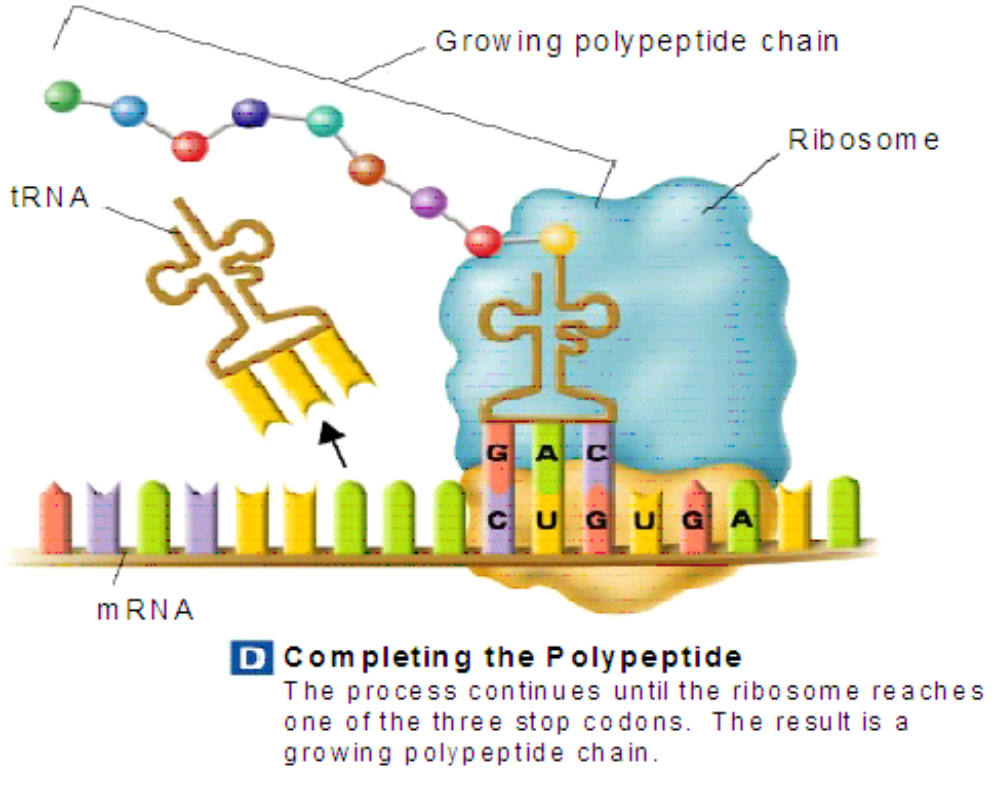
- Process
  5. Each codon on mRNA is read and a tRNA with the matching anti-codon carries the correct amino acid to the ribosome
  6. There, the tRNA binds to the ribosome and the amino acid is linked to the previous one by a peptide bond
  7. Process continues, amino acids are linked, and the polypeptide chain grows until the ribosome reaches the “stop” codon
  8. Protein is completed and folds into its structure

Translation-visual



Translation-visual

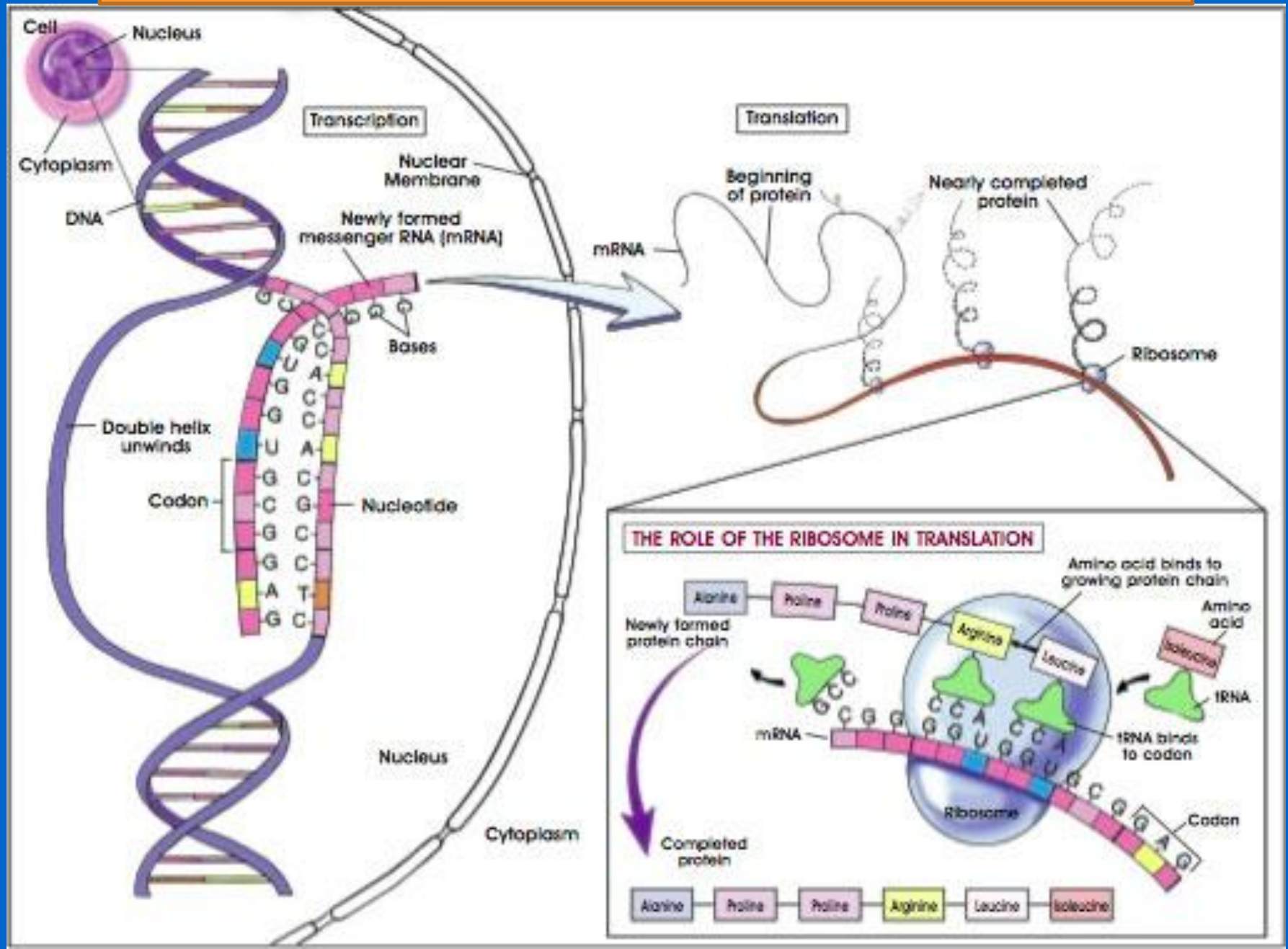


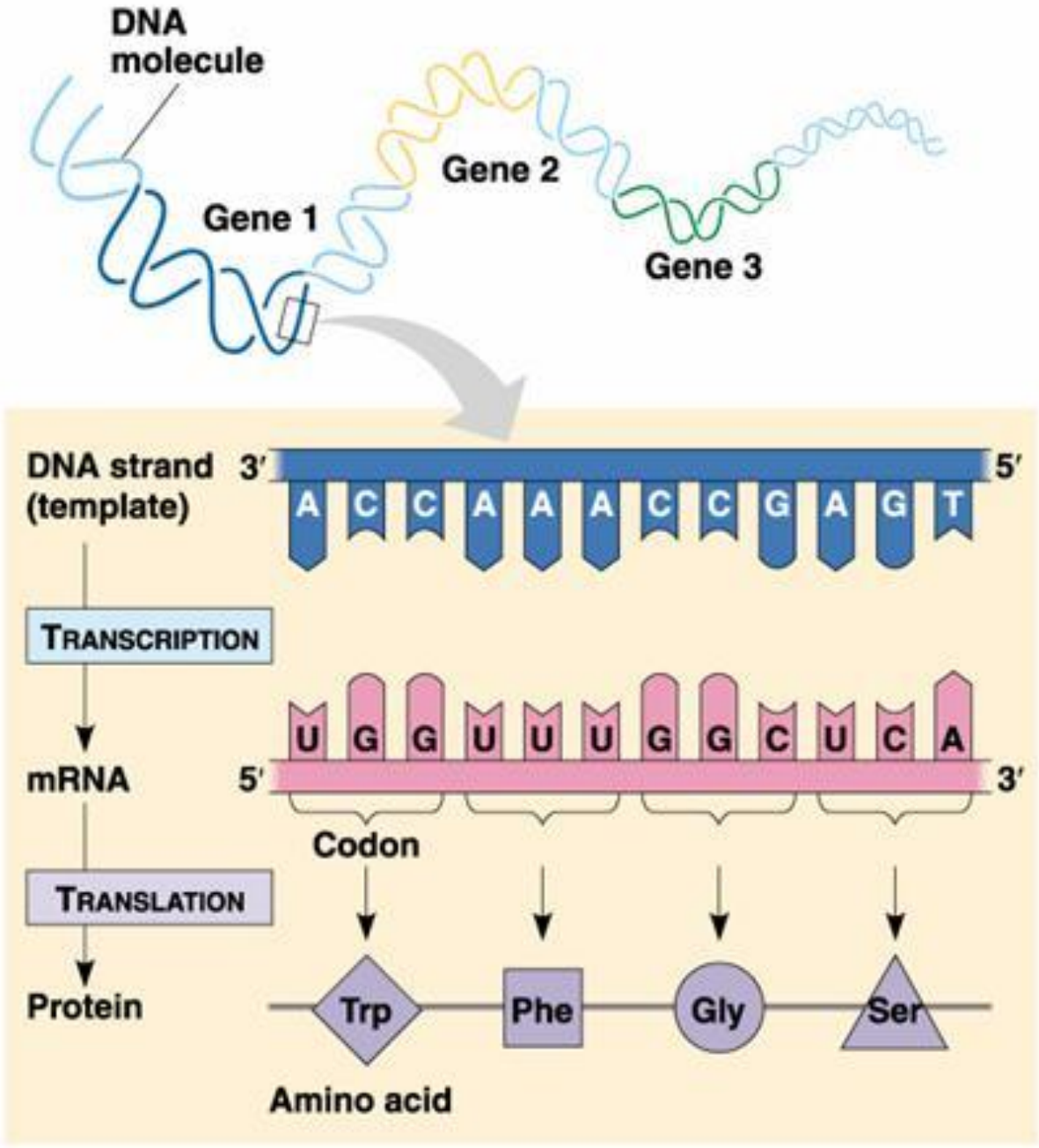


- QQ#6: After watching the video and seeing the images on the previous two slides, summarize what occurs during translation

http://www.youtube.com/watch?v=5bLEDd-PSTQ&feature=related
start at 48 seconds

More pictures…because they are better than words…





More pictures…because they are better than words…

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