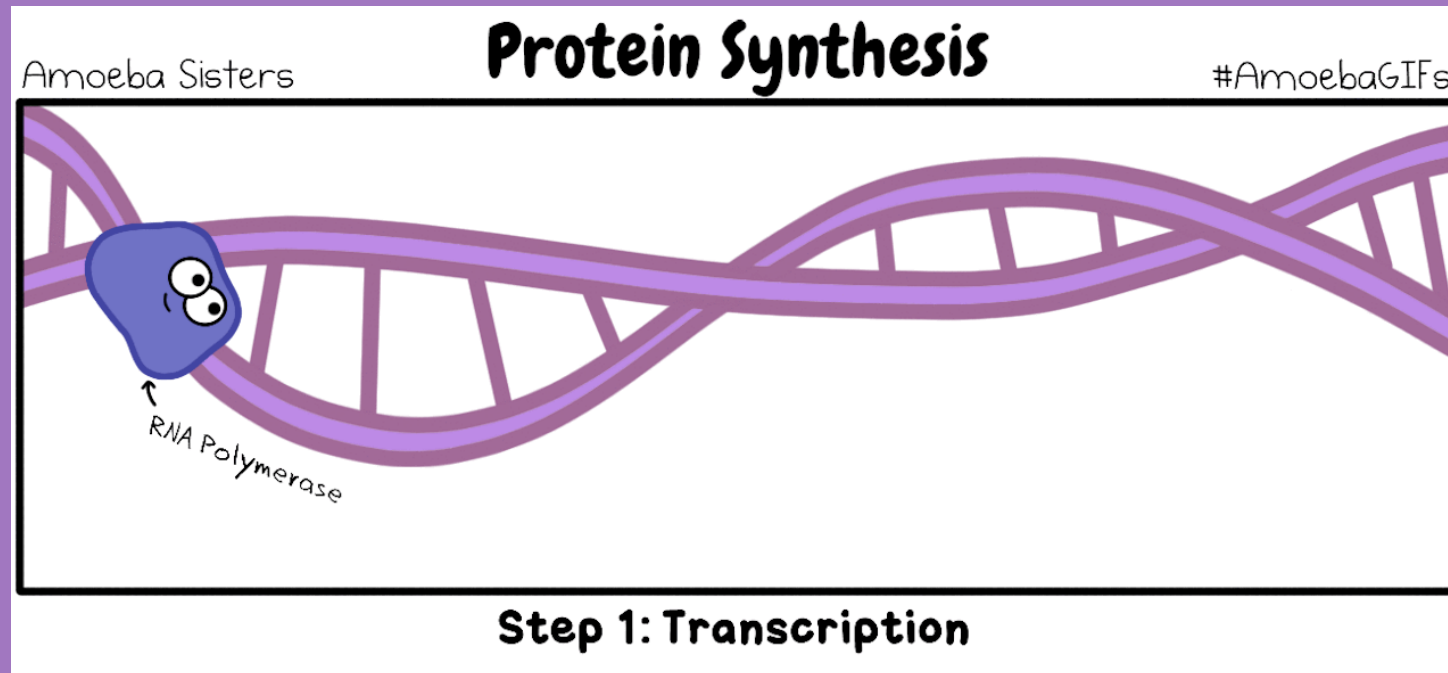


Protein Synthesis

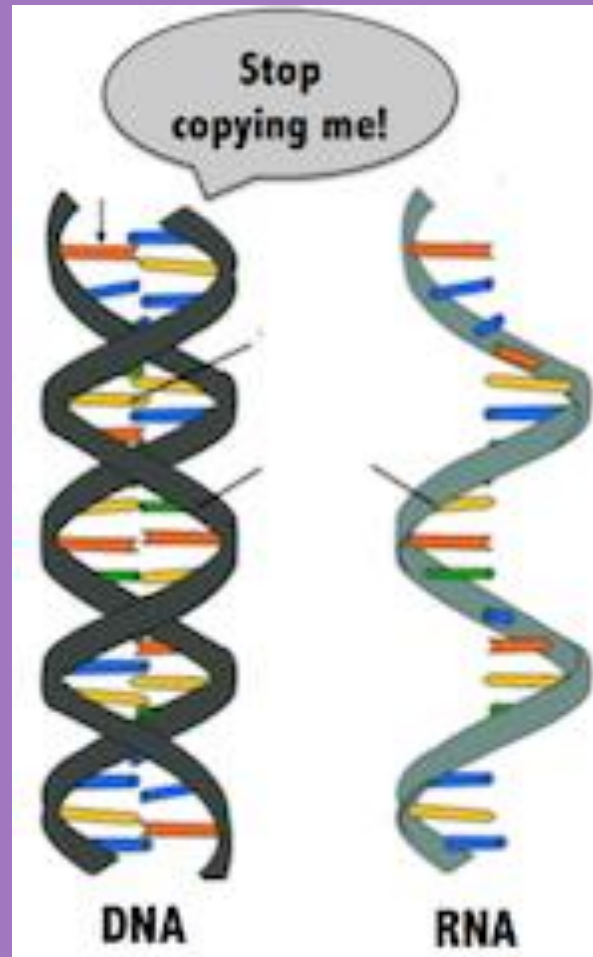


Protein Synthesis

- Process of turning the instructions found in DNA into working proteins.
- **Step 1: Transcription**
- **Step 2: Translation**



Step 1: Transcription



Transcription

- DNA is coded, and needs to be delivered and read in order to make proteins.
- We can make a messenger RNA (mRNA) in the process called “transcription” that will travel to the ribosomes carrying a copy of the DNA’s information.

Transcription

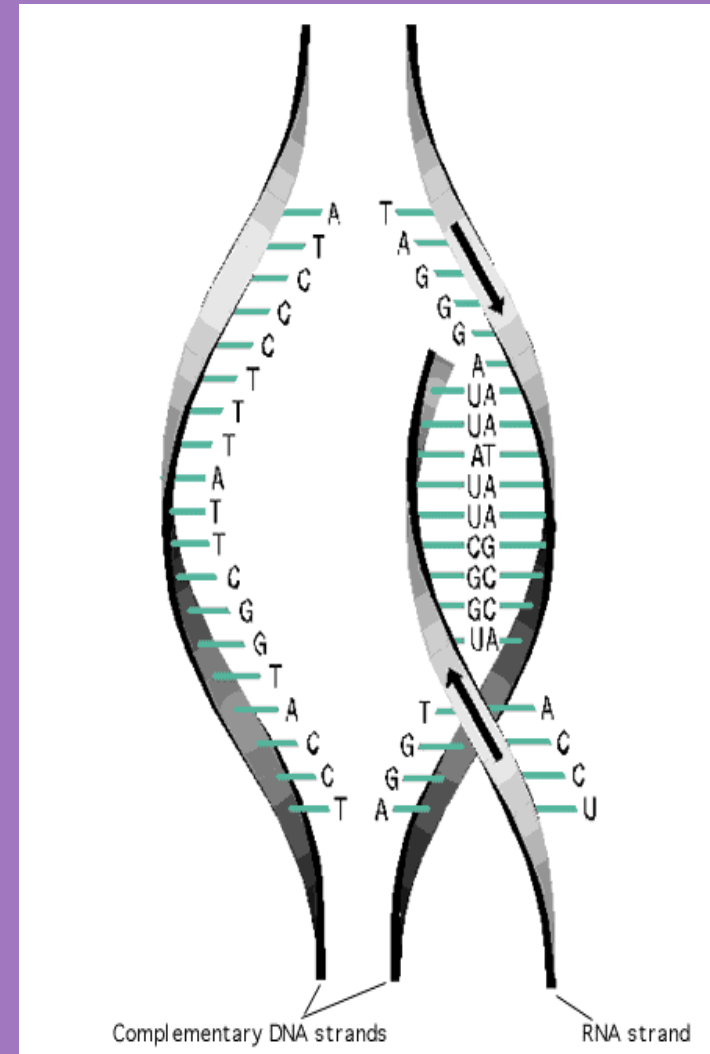
- First, the DNA helix separates like it did in replication.
- But this time each template strand will base pair with RNA's nitrogen bases:

A C G U

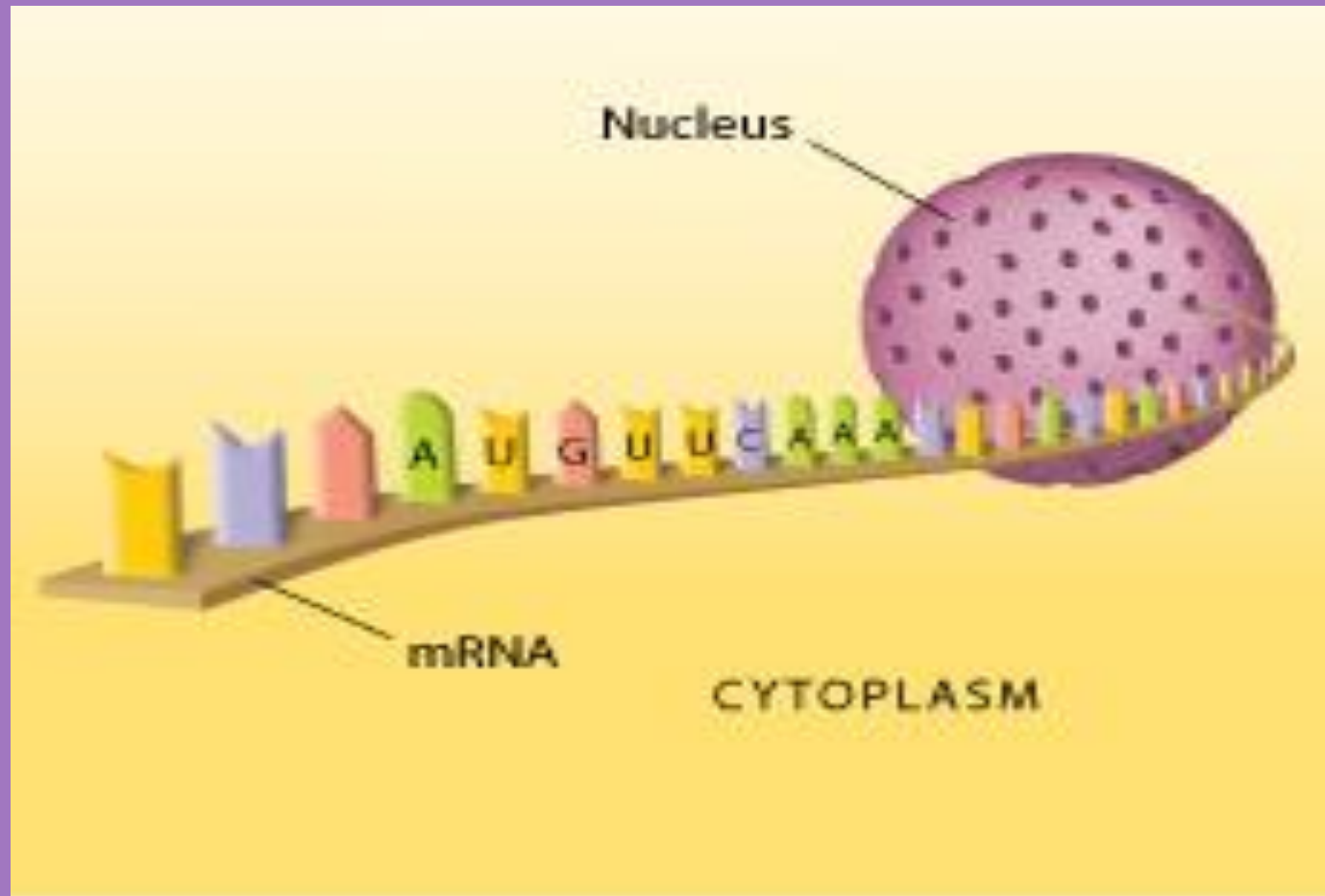
- Cytosine with Guanine
- Adenine with Uracil

(not Thymine anymore!)

- Bases are put together by the enzyme: RNA Polymerase



- This new single mRNA strand will leave the nucleus and make it's way to the ribosome.



Transcribe this strand:

-A C T G A-

-U G A C U-

The story so far:

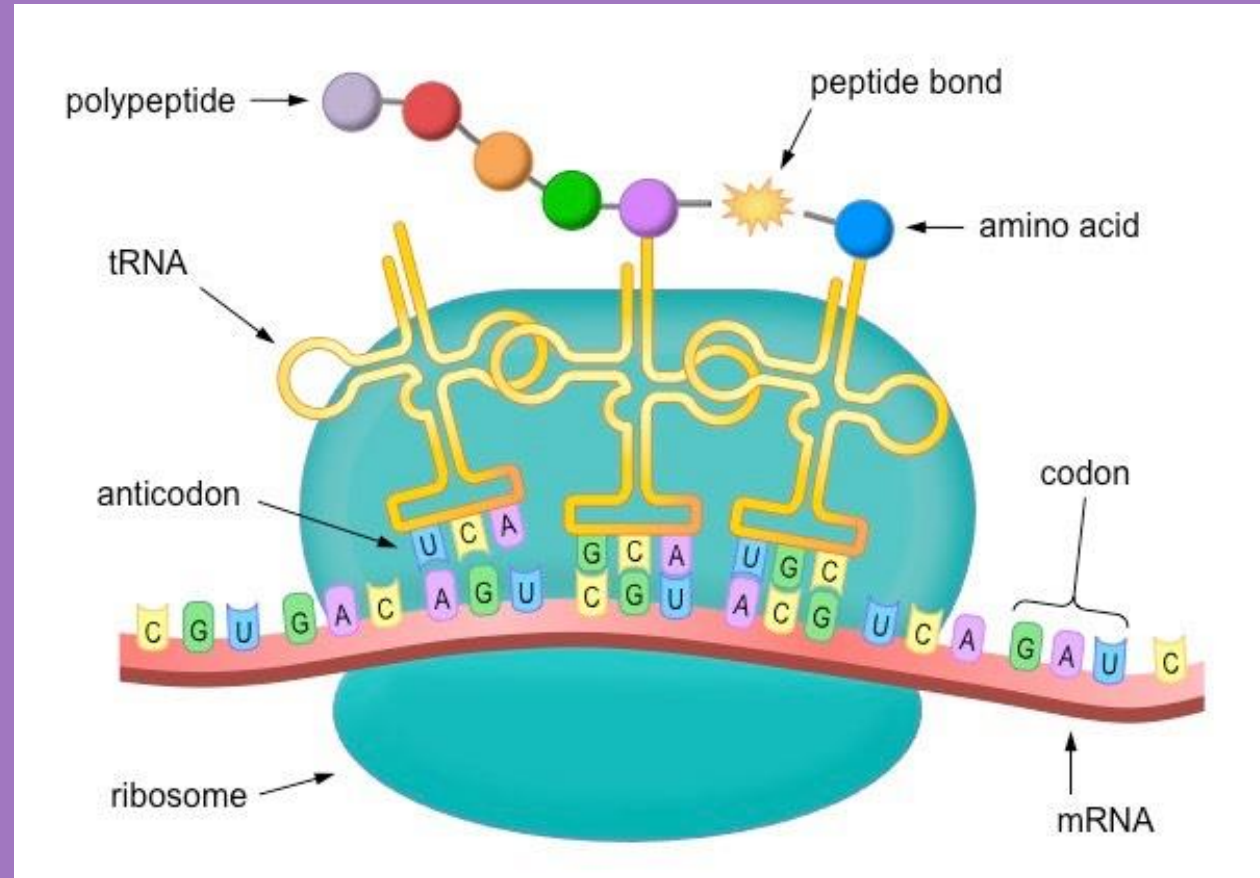
- DNA has been transcribed into the form of mRNA
- The mRNA has travelled from the nucleus to the Ribosome.

Now what?

What message is contained in the mRNA?

Why did the cell do all this?

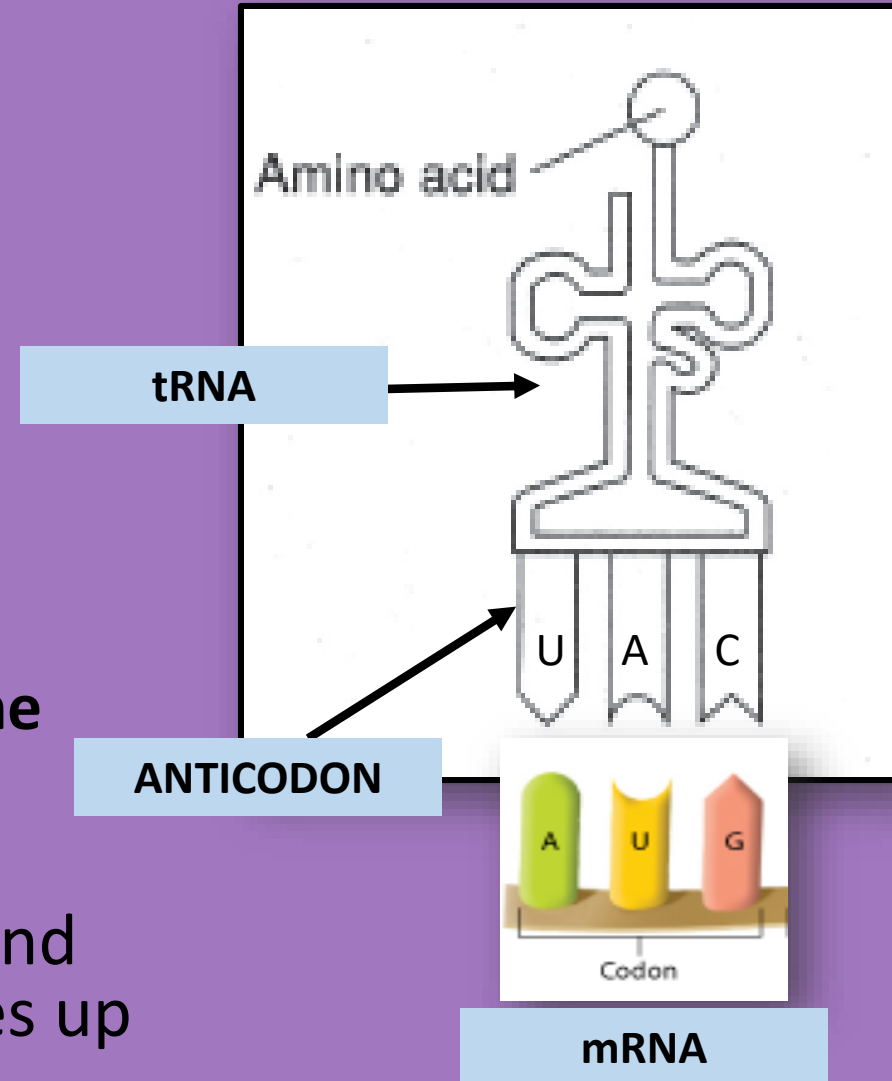
Step 2: Translation



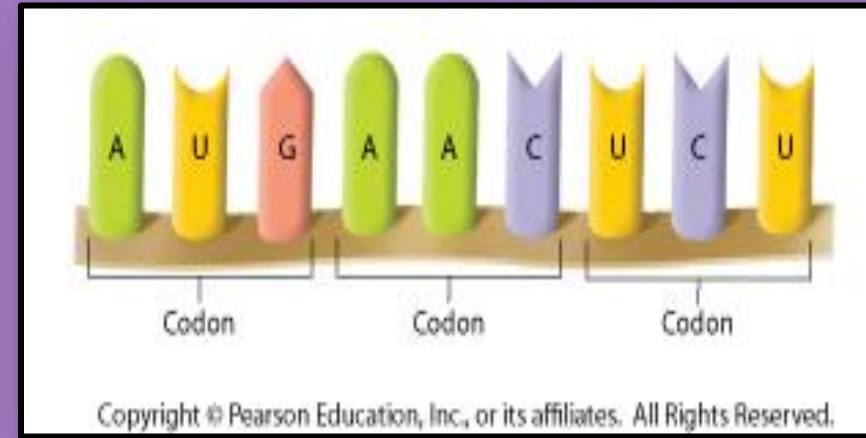
Translation:

when the cell uses information from mRNA to produce proteins.

- Happens in the ribosome
- tRNA translates the code on the mRNA to an amino acid
 - tRNA is a 'middle man'
 - Amino acid on one side, and an *anticodon* that matches up with a *codon* from mRNA



How is mRNA read?



- The mRNA strand is read in:
Codons: sets of 3 bases

Starts reading at the “start” codon:
AUG

Stops reading at the “stop” codon:
UAA, UAG, UGA

How many codons are in this strand of mRNA?

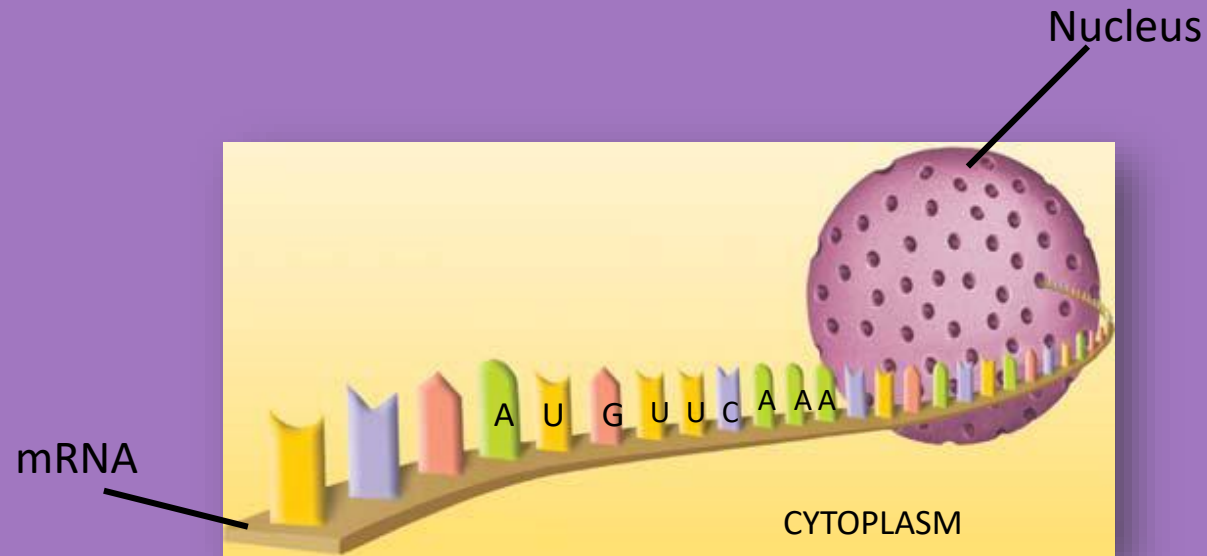
AUGCCAGCAUACUUAACAUGA =

7!

AUG | CCA | GCA | UAC | UUA | CAU | UGA

Step 1

Messenger RNA is transcribed in the nucleus and then enters the cytoplasm.

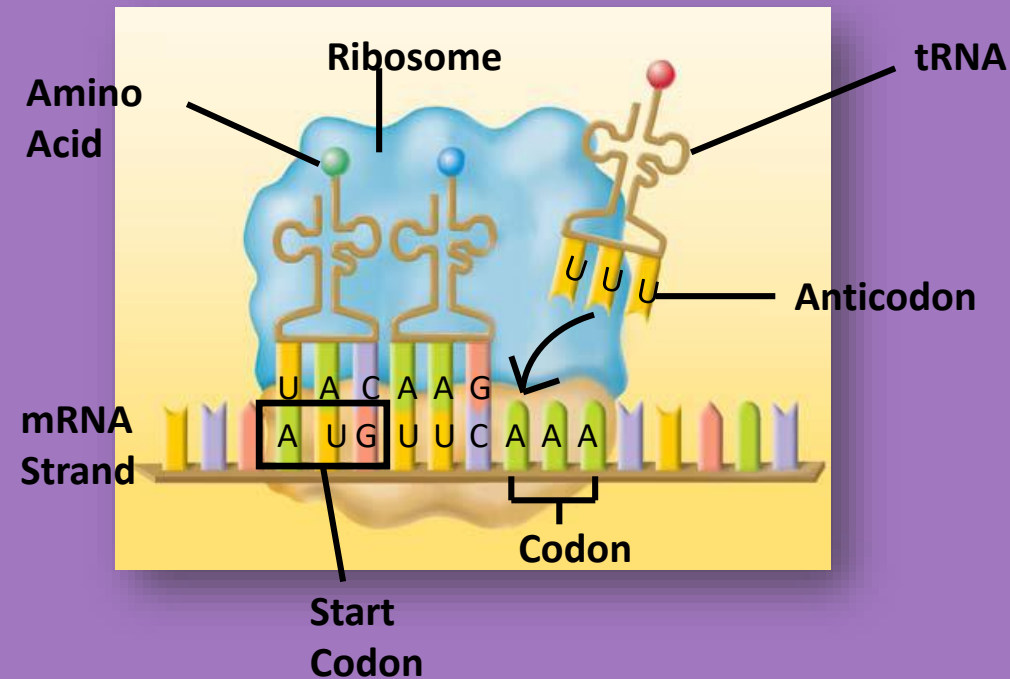


Where is it going???

Why doesn't the mRNA stay in the nucleus????

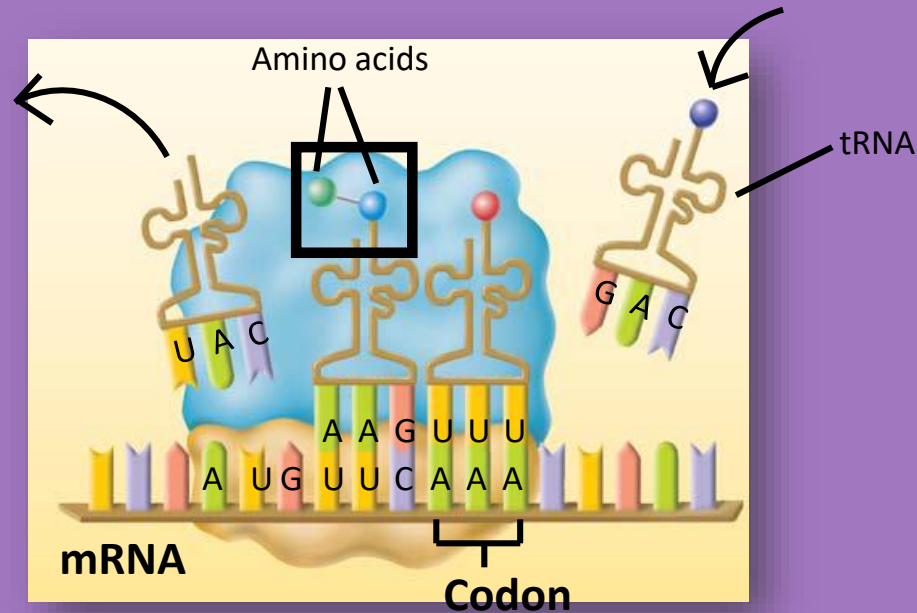
Step 2

- Happens at the ribosomes
- Translation begins at the start codon (AUG)
- tRNA comes in, and basepairs to the mRNA.
- Each tRNA contains 3 bases (anticodon) that tell it where to attach on the mRNA.



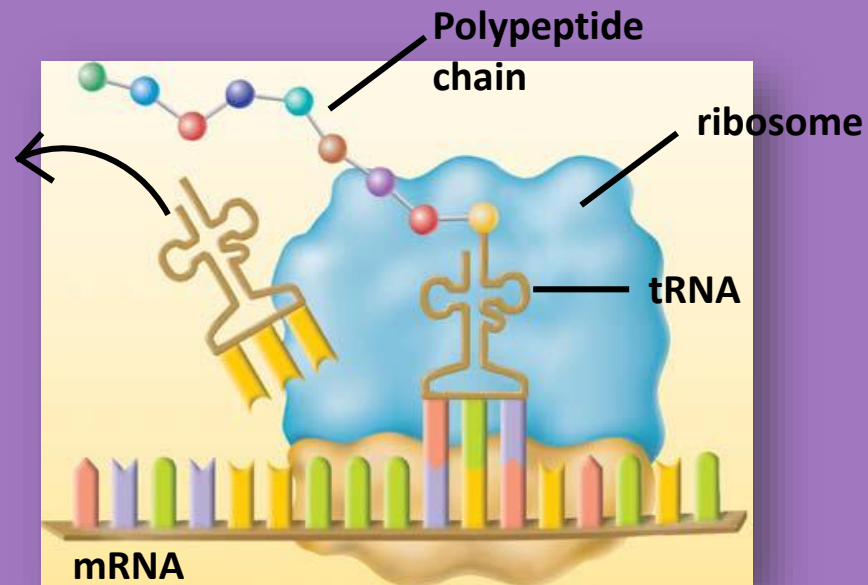
Step 3

- The ribosome bonds the amino acids together.
- After tRNA drops off its amino acid, the mRNA releases the tRNA.
- New tRNA brings the next amino acid in.



Step 4

- The process continues, building the polypeptide chain, until the tRNA meets a “stop” codon.
- Once it reaches a “stop” codon, the polypeptide chain is released.

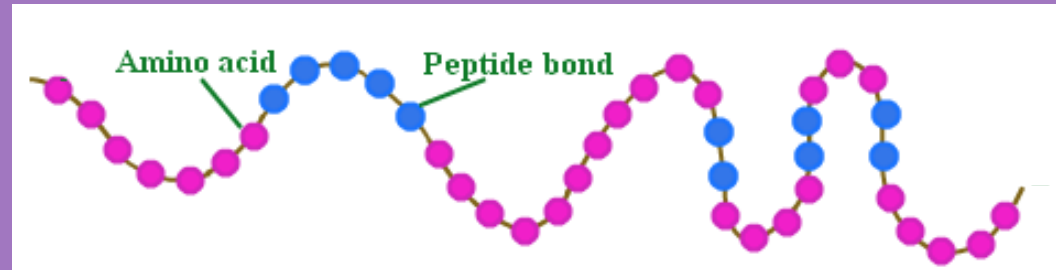


**What's our
end product
here?**

**What did we
make?**

Let's see Translation in action!!!!





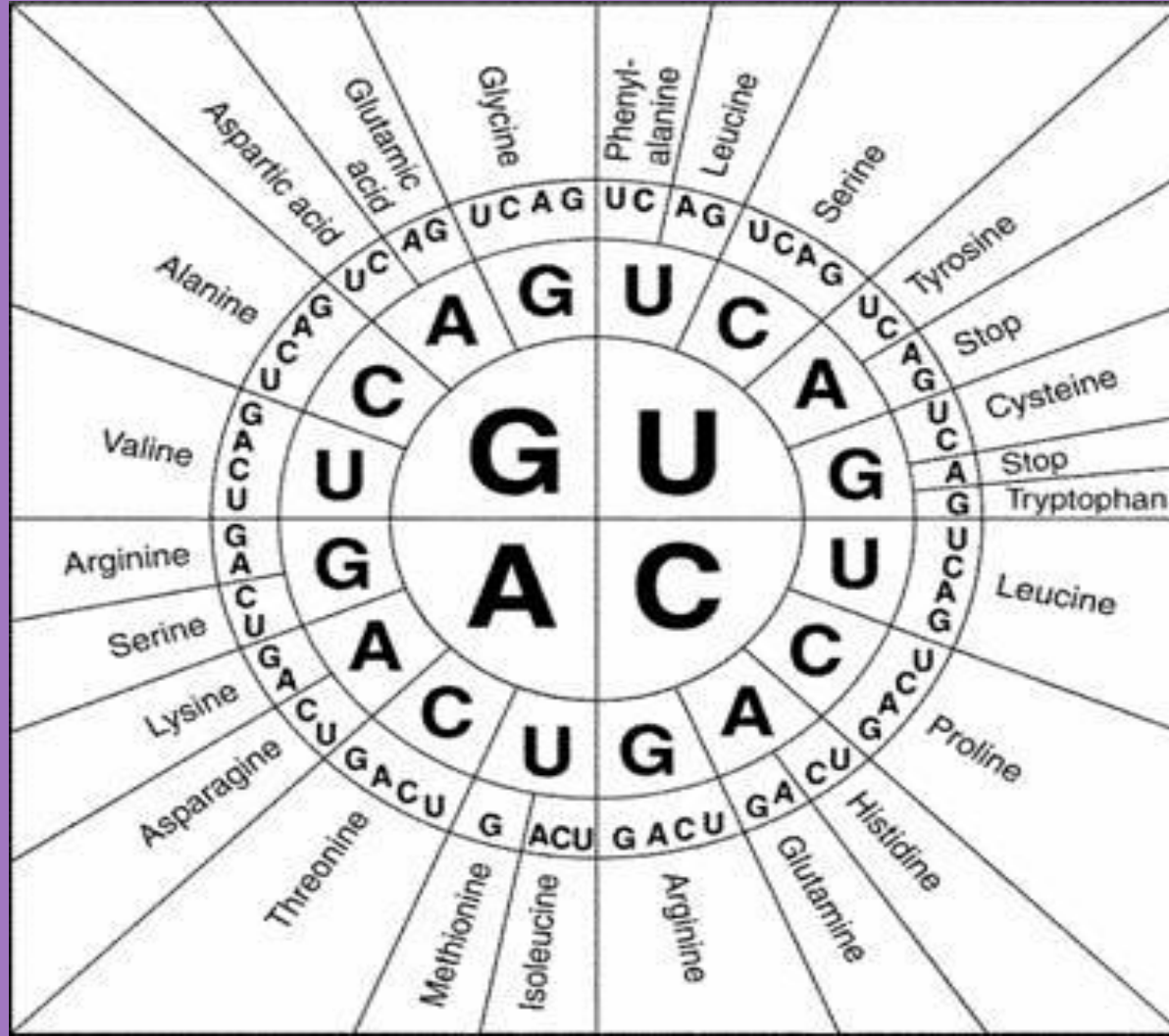
So now we have a polypeptide chain...or a **PROTEIN!**

Scientists need to be able to tell proteins apart sometimes....*can you think of a reason why?*

In order to tell proteins apart we need to know the names of all the amino acids that make them up!

Naming Amino Acids

To find out which amino acid is being translated, take the mRNA codon that is being translated and find it in the chart.



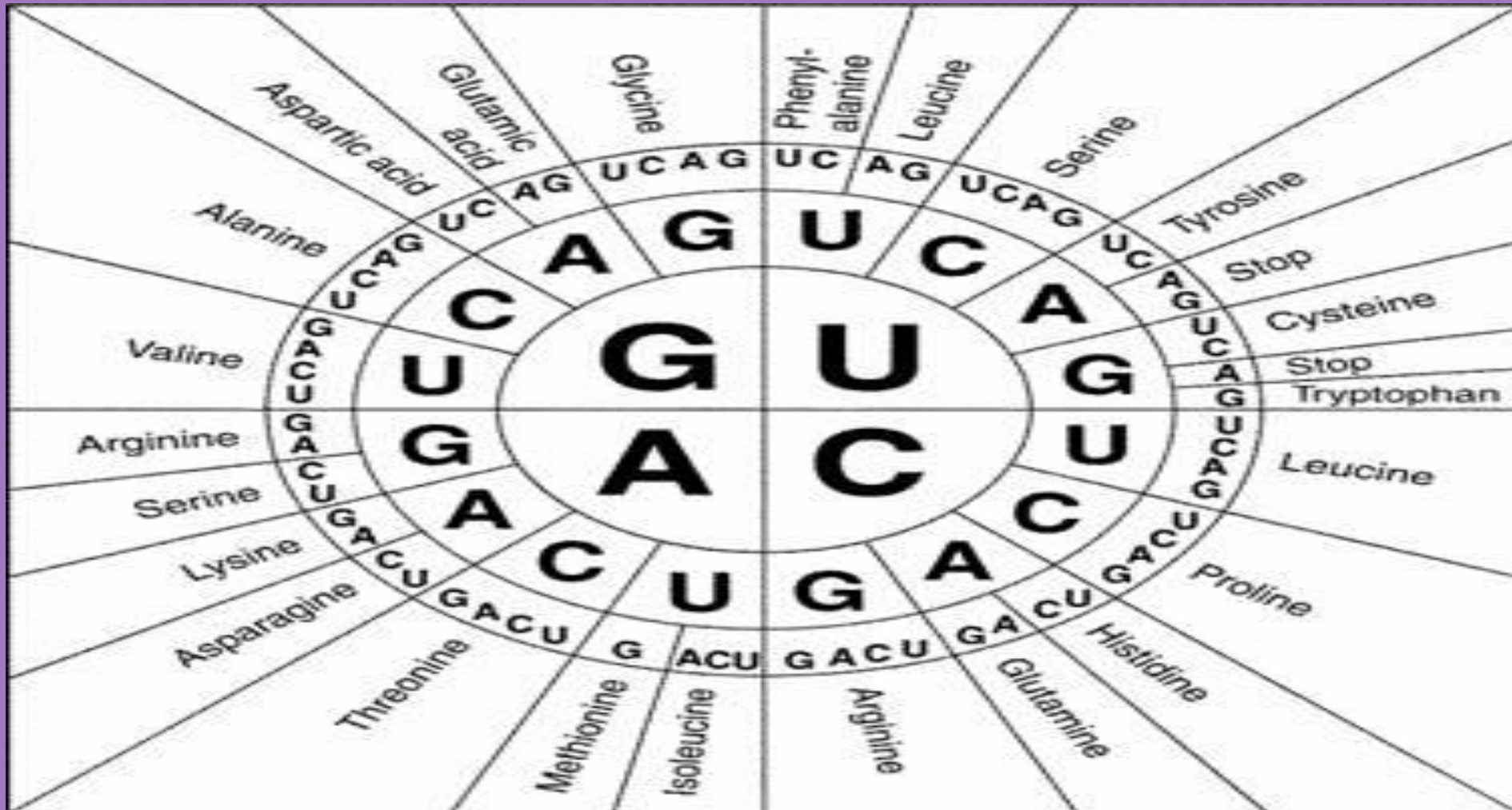
mRNA Strand:

AUGUCUACCCGA

- AUG: (Start) Methionine
- UCU: Serine
- ACC: Threonine
- CGA: Arginine
- UAG: STOP

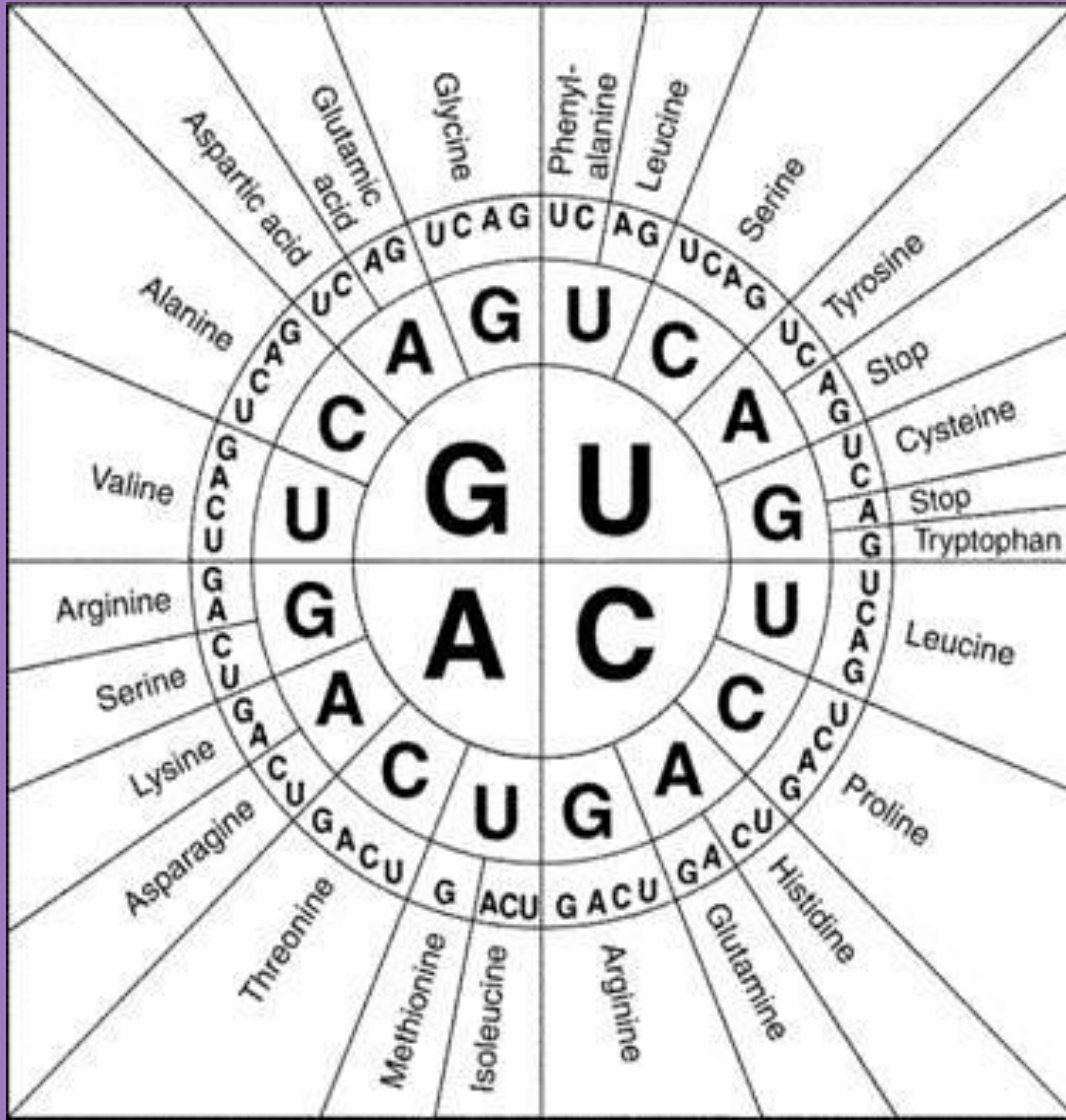
Naming Amino Acids You try!!!!

mRNA Strand: AUGGAGACCUCGCCCUAG



Naming Amino Acids You try!!!!

AUGGAGACCUCGCCUAG



- AUG: (Start) Methionine
- GAG: Glutamic Acid
- ACC: Threonine
- UCG: Serine
- CCC: Proline
- UAG: STOP