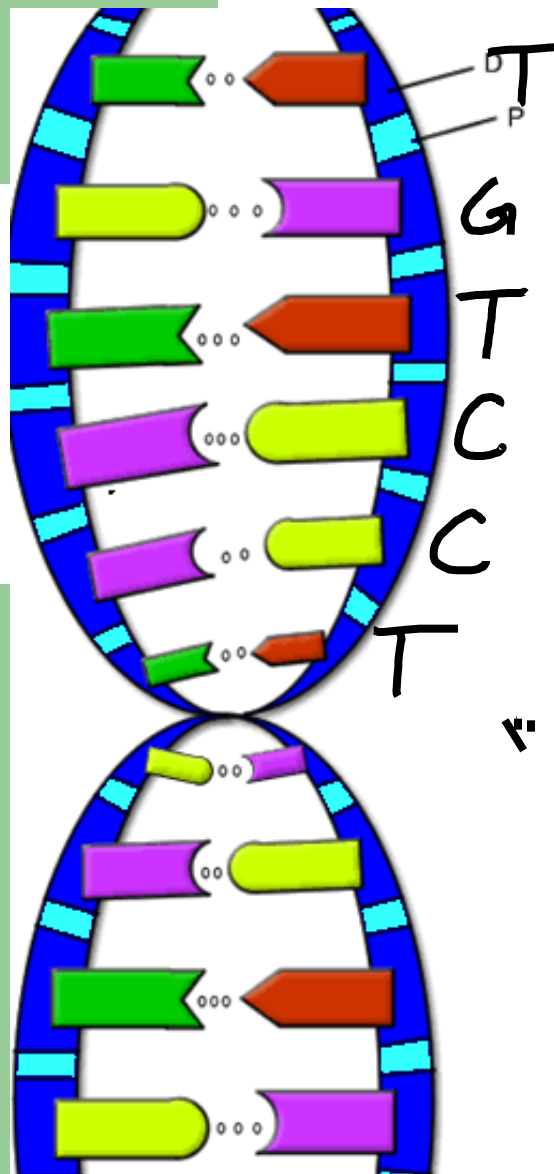


# Translation



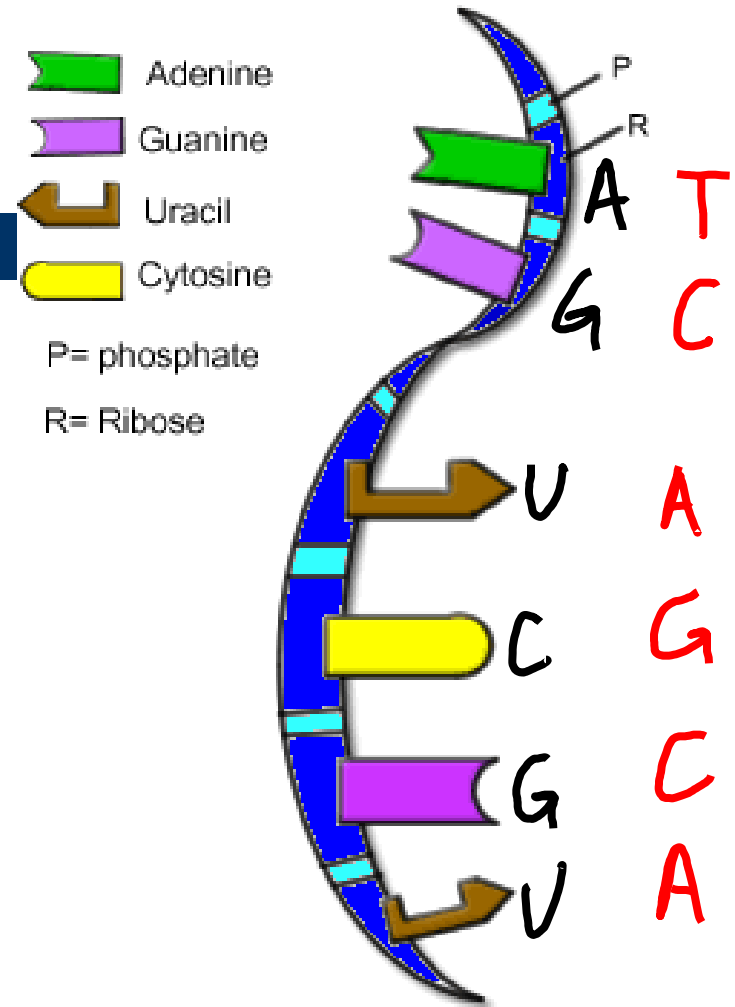
- Thymine
- Adenine
- Guanine
- Cytosine
- D = Deoxyribose (sugar)
- P = Phosphate
- Hydrogen Bond

A  
C  
A  
G  
G  
A

mRNA to proteins ...

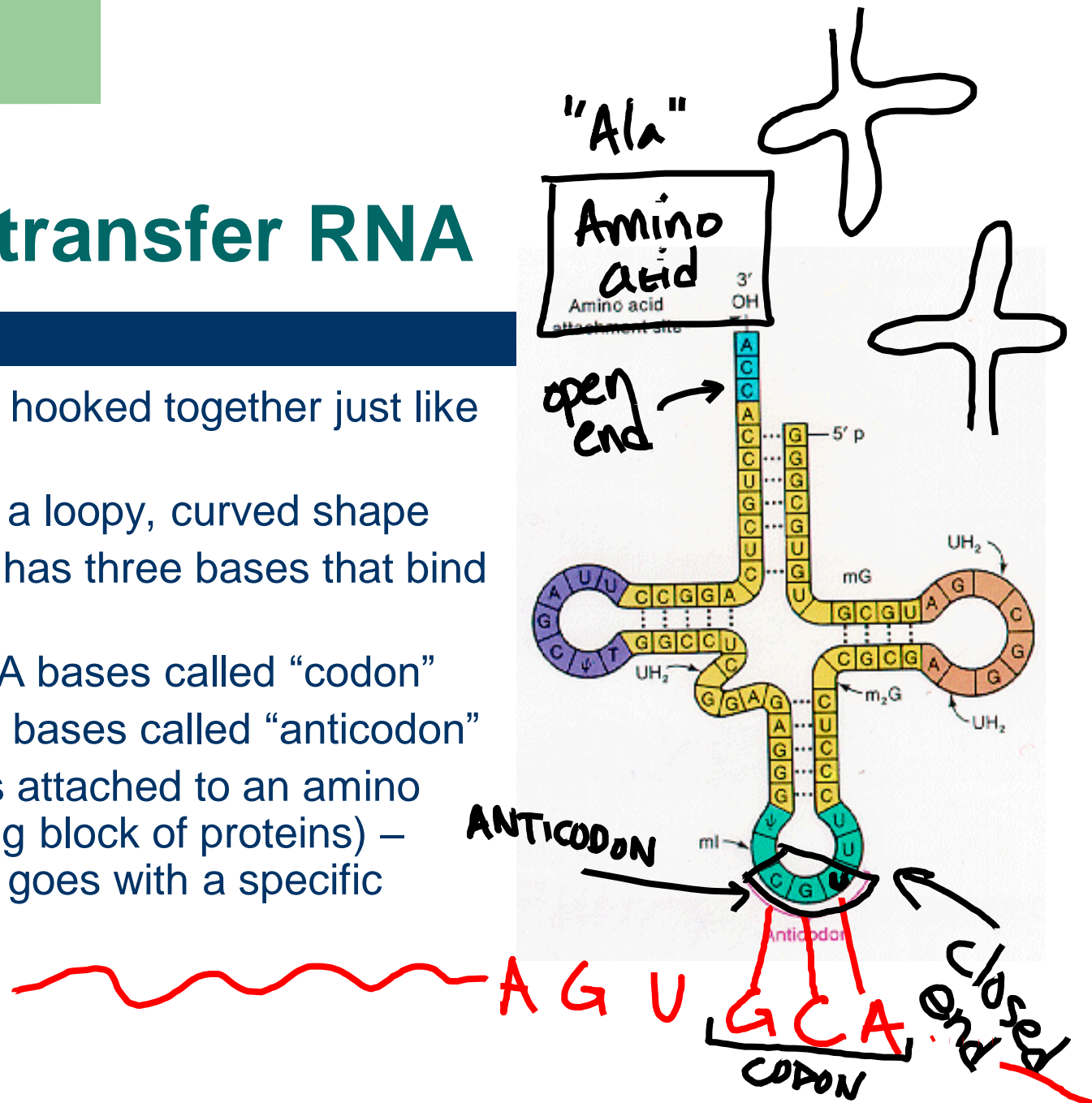
# mRNA

- RNA nucleotides (sugar + base) all hooked together
- Complementary to transcribed DNA strand



# tRNA – transfer RNA

- Nucleotides hooked together just like mRNA
- Arranged in a loopy, curved shape
- Closed end has three bases that bind to mRNA
- Three mRNA bases called “codon”
- Three tRNA bases called “anticodon”
- Open end is attached to an amino acid (building block of proteins) – each codon goes with a specific amino acid



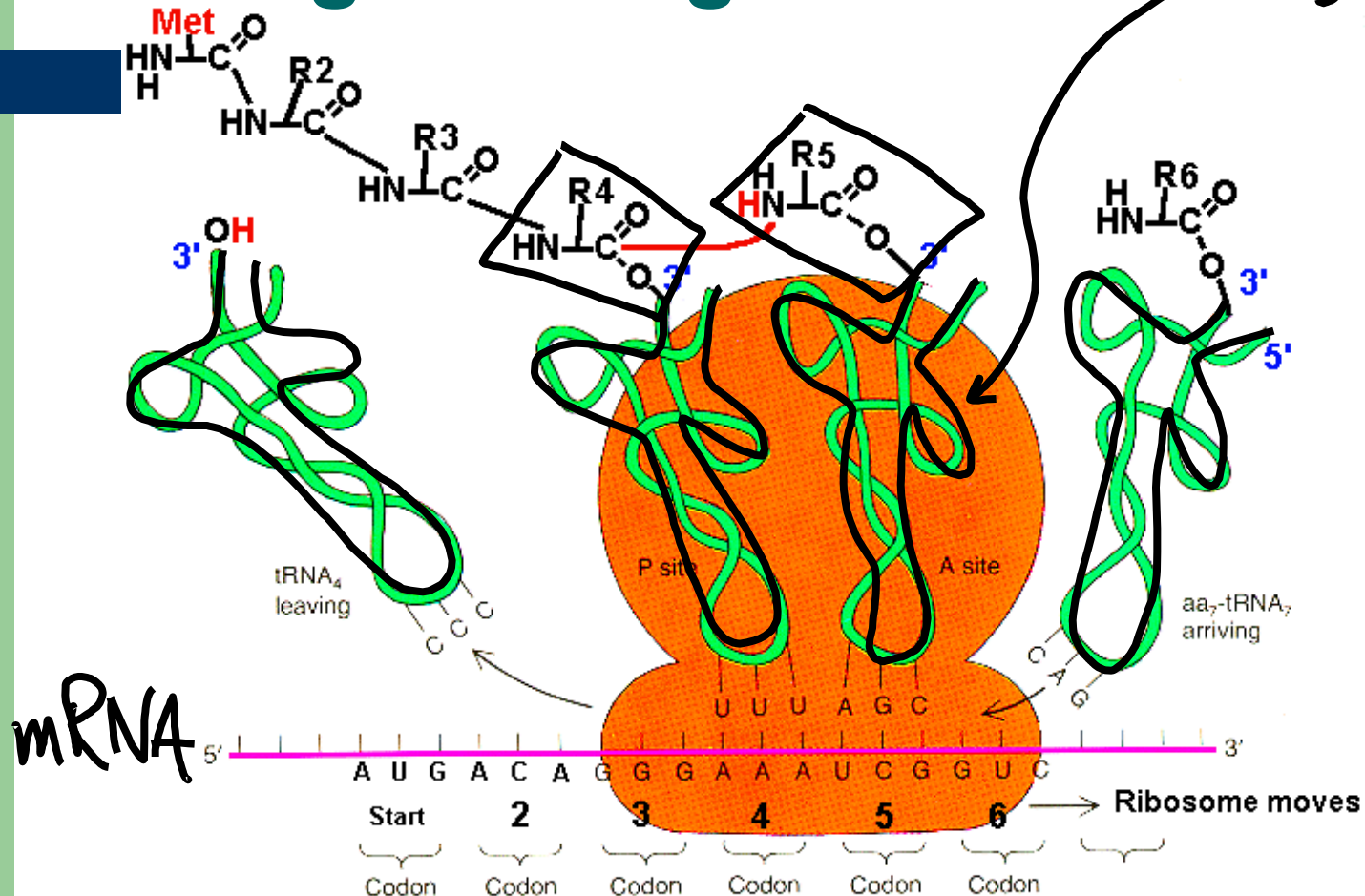
# Codons

- Three base sequences – many codons stand for one amino acid
- AUG – Methionine (start)
- UAA, UAG, UGA – stop
- 20 Different amino acids

|            |   | Second Letter                            |                                    |  |   |                  |            |
|------------|---|--|------------------------------------|--|---|------------------|------------|
|            |   | U  | C                                  | A  | G   |                  |            |
| 1st letter | U | UUU   Phe<br>UUC  <br>UUA   Leu<br>UUG   | UCU  <br>UCC   Ser<br>UCA  <br>UCG | UAU   Tyr<br>UAC  <br>UAA   Stop<br>UAG   Stop | UGU   Cys<br>UGC  <br>UGA   Stop<br>UGG   Trp | U<br>C<br>A<br>G | 3rd letter |
|            | C | CUU  <br>CUC   Leu<br>CUA  <br>CUG       | CCU  <br>CCC   Pro<br>CCA  <br>CCG | CAU   His<br>CAC  <br>CAA   Gln<br>CAG         | CGU  <br>CGC   Arg<br>CGA  <br>CGG            | U<br>C<br>A<br>G |            |
|            | A | AUU  <br>AUC   Ile<br>AUA  <br>AUG   Met | ACU  <br>ACC   Thr<br>ACA  <br>ACG | AAU   Asn<br>AAC  <br>AAA   Lys<br>AAG         | AGU   Ser<br>AGC  <br>AGA   Arg<br>AGG        | U<br>C<br>A<br>G |            |
|            | G | GUU  <br>GUC   Val<br>GUA  <br>GUG       | GCU  <br>GCC   Ala<br>GCA  <br>GCG | GAU   Asp<br>GAC  <br>GAA   Glu<br>GAG         | GGU  <br>GGC   Gly<br>GGA  <br>GGG            | U<br>C<br>A<br>G |            |

# Putting it all together ...

RIBOSOME



# “Central Dogma”

