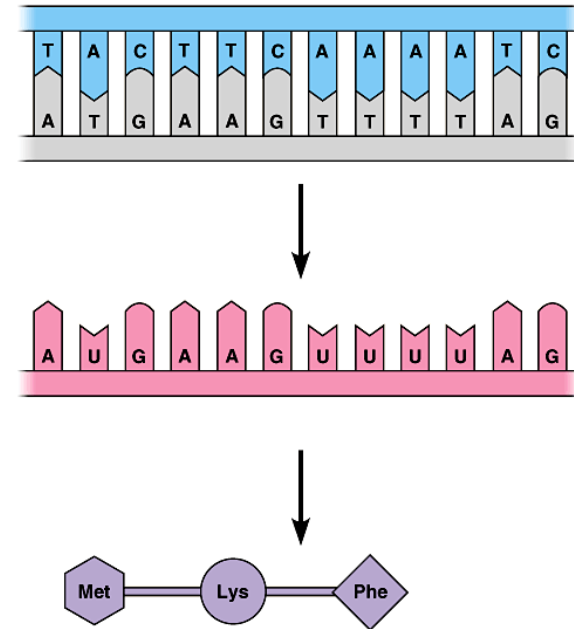


Transcription

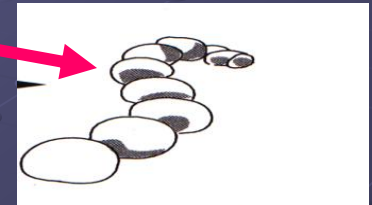
and

Translation



But first, a little bit of review...

- YOU & your cells are made mostly of PROTEIN
- Proteins are made of Amino Acids (20 kinds)
- AA + AA + AA + AA = polypeptide



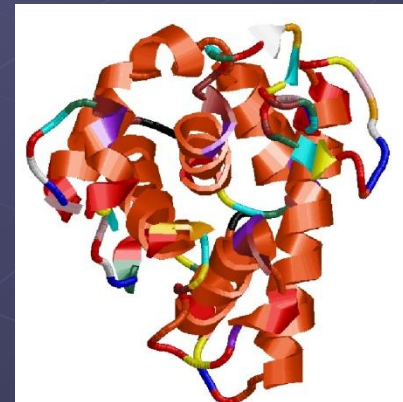
- Polypeptide + Polypeptide = Protein



+



=



- Different Amino Acids = different Protein SHAPES = different function

Differences between DNA and RNA

- DeoxyriboNucleic Acid

- 2 strands

- 5-C sugar is deoxyribose

- Nitrogen bases:

- Cytosine
- Guanine
- Adenine
- Thymine

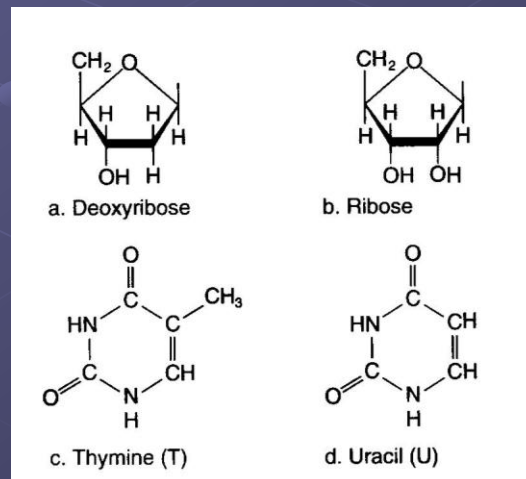
- RiboNucleic Acid

- 1 strand

- 5-C sugar is ribose

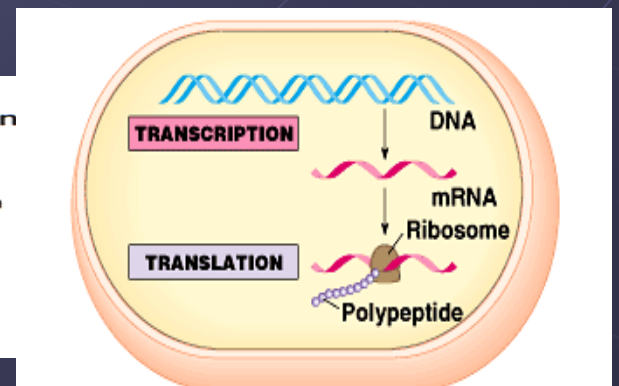
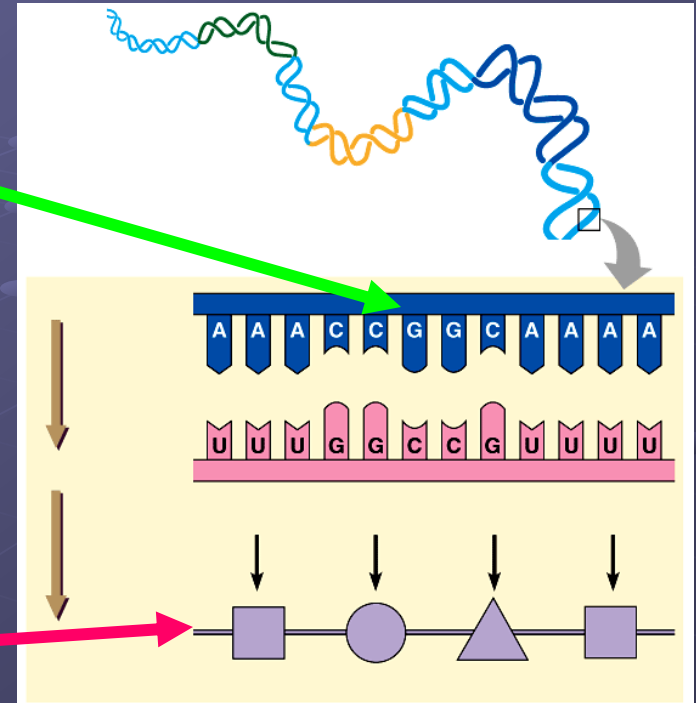
- Nitrogen bases:

- Cytosine
- Guanine
- Adenine
- Uracil

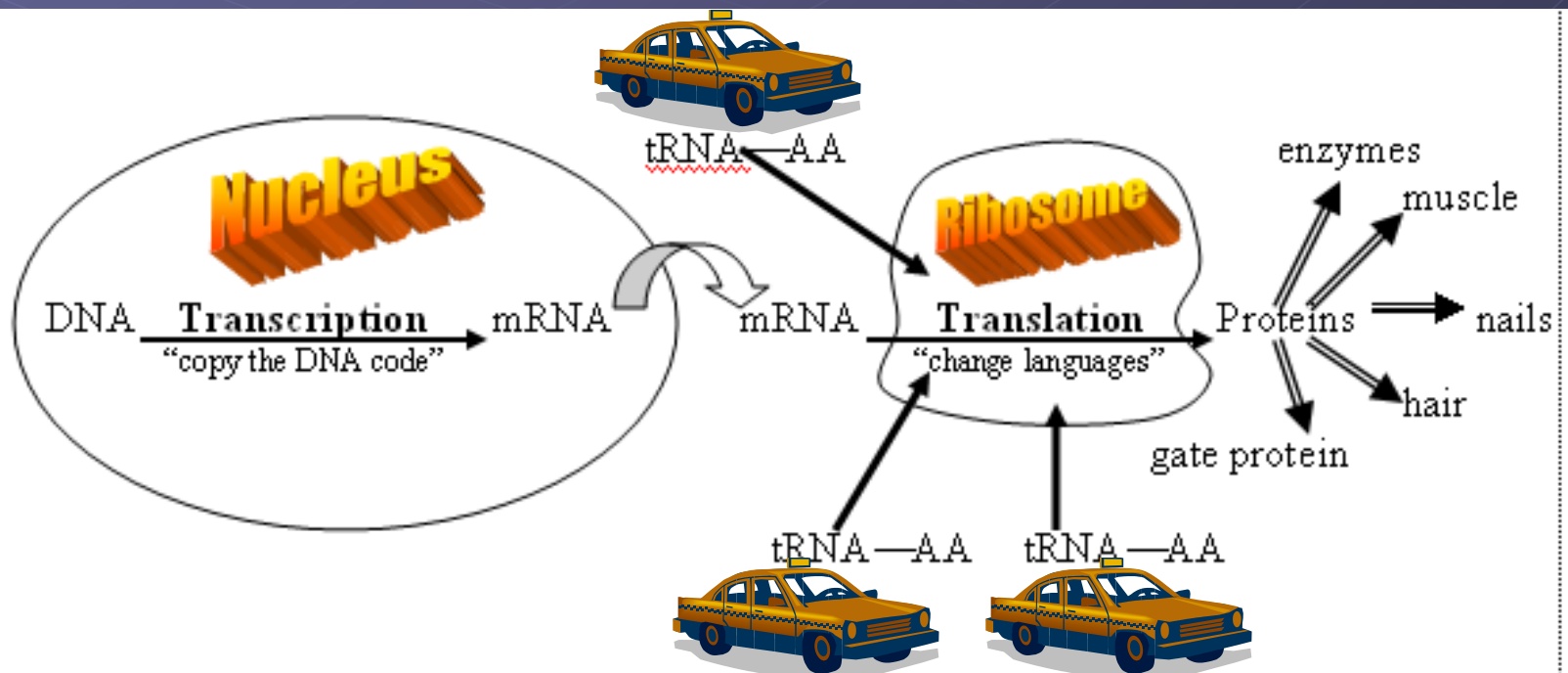


Protein Production: The BIG PICTURE

- Gene = piece of DNA code with instructions for making a trait
- Each gene has a code for making 1 specific polypeptide



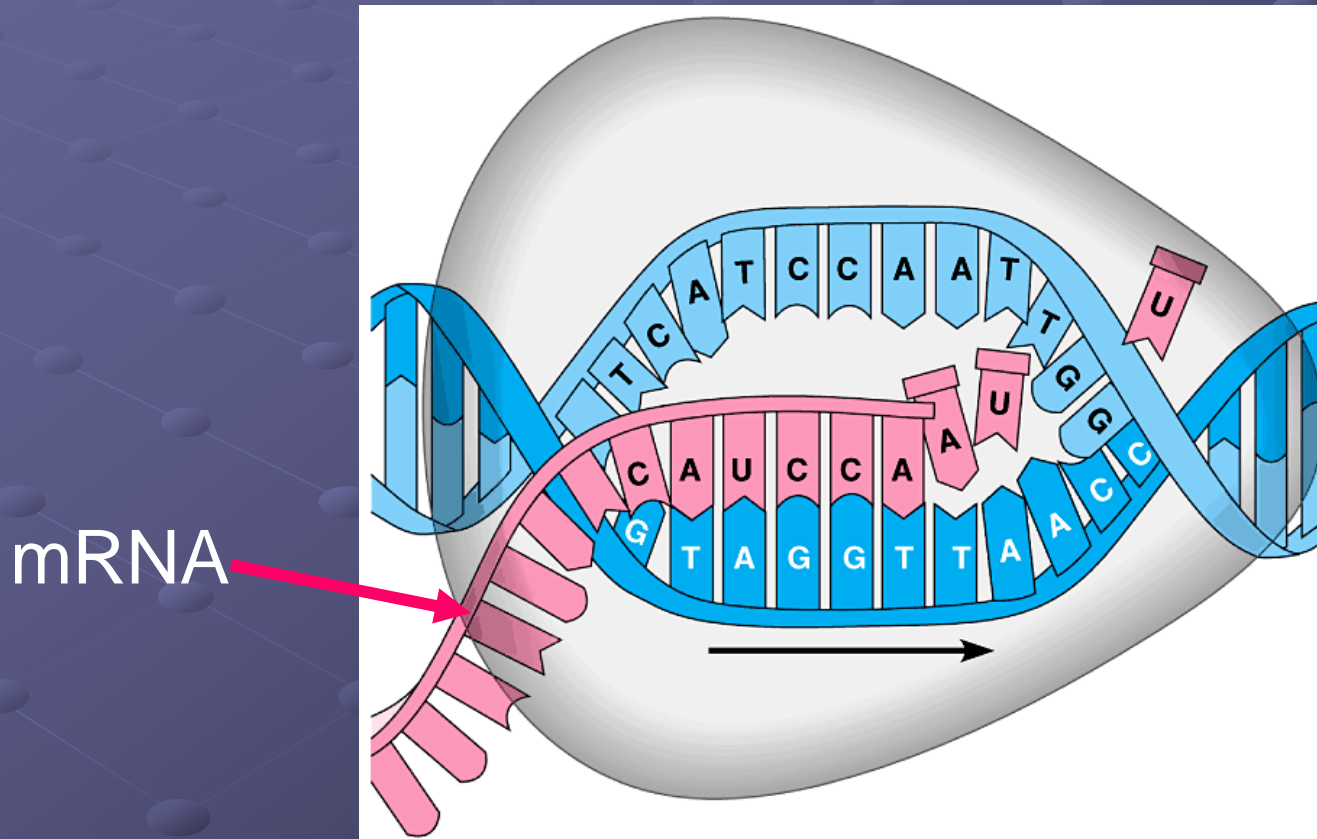
- Recent studies of human DNA indicate there are ~ 24,000 genes in one blueprint.
- Protein Production is a 2-part story:
 - Part I = Transcription (in the nucleus)
 - Part II = Translation (at a ribosome)



Protein Production

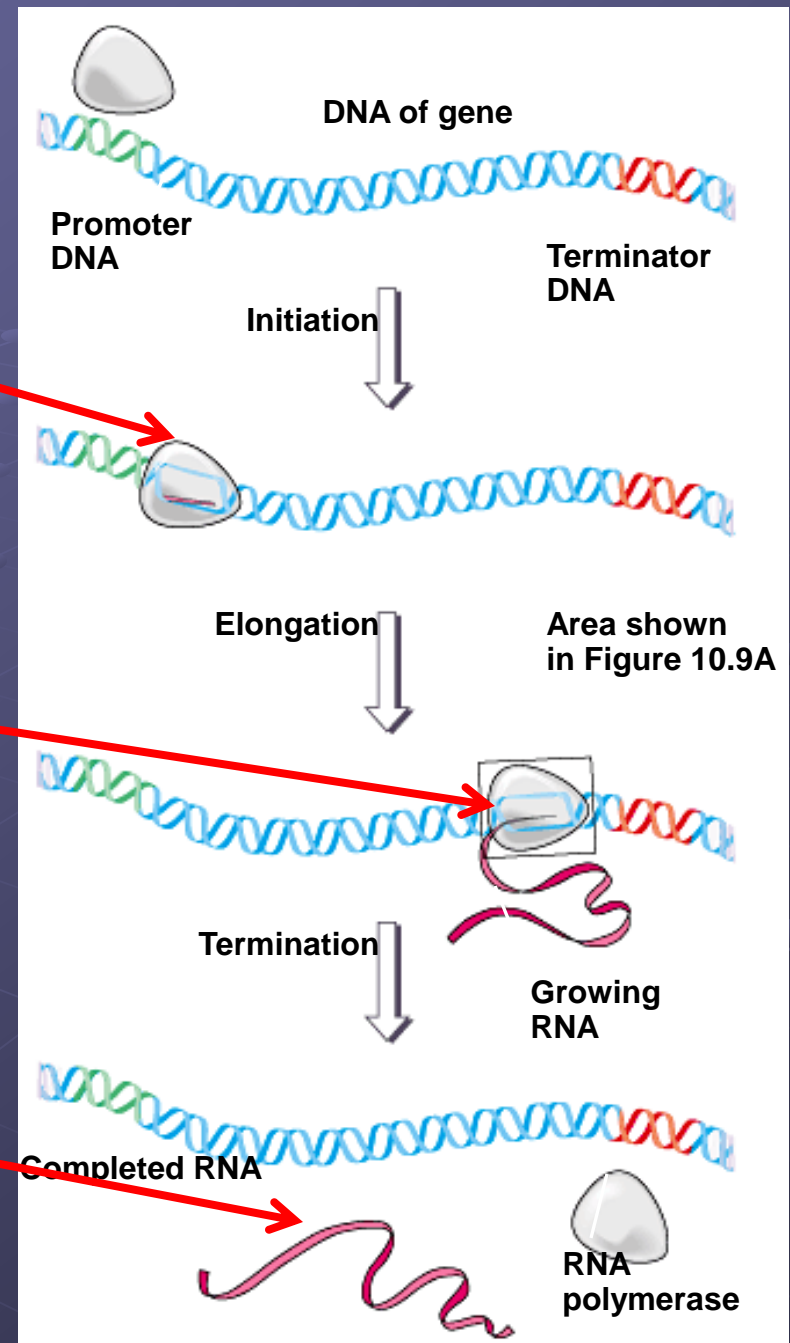
Part I: TRANSCRIPTION

- The DNA gene code is copied into messenger RNA (from here forth known as mRNA)

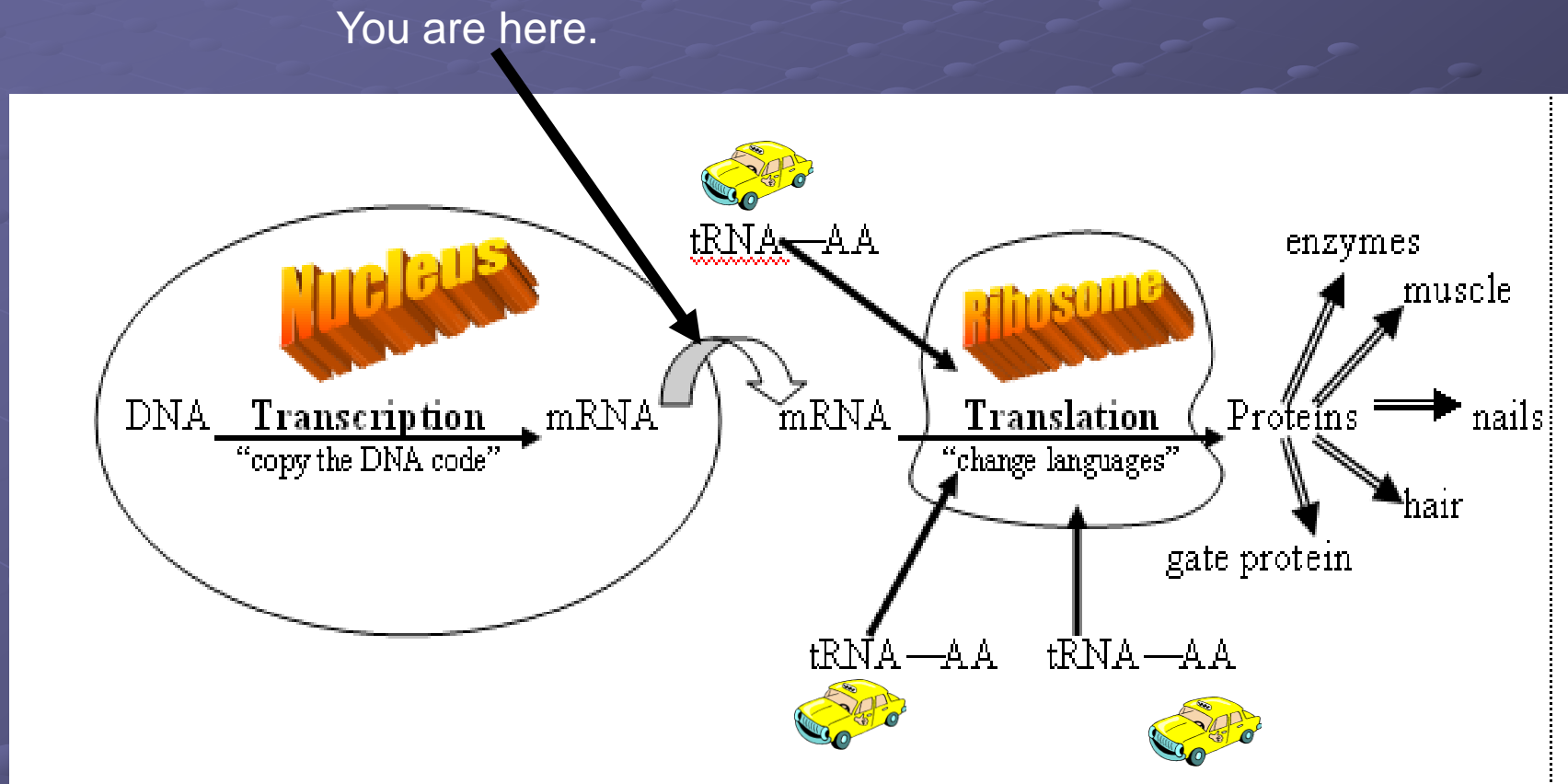


● In transcription, the DNA helix unwinds and unzips

- RNA nucleotides line up along one strand of the DNA following the Base-pairing rules
- After the gene code is copied into mRNA, the single-stranded mRNA peels away and the DNA strands rejoin



- Next, the mRNA carries a copy of the gene code instructions from the nucleus out to a ribosome (the tiny protein-making factories)



Part II: TRANSLATION

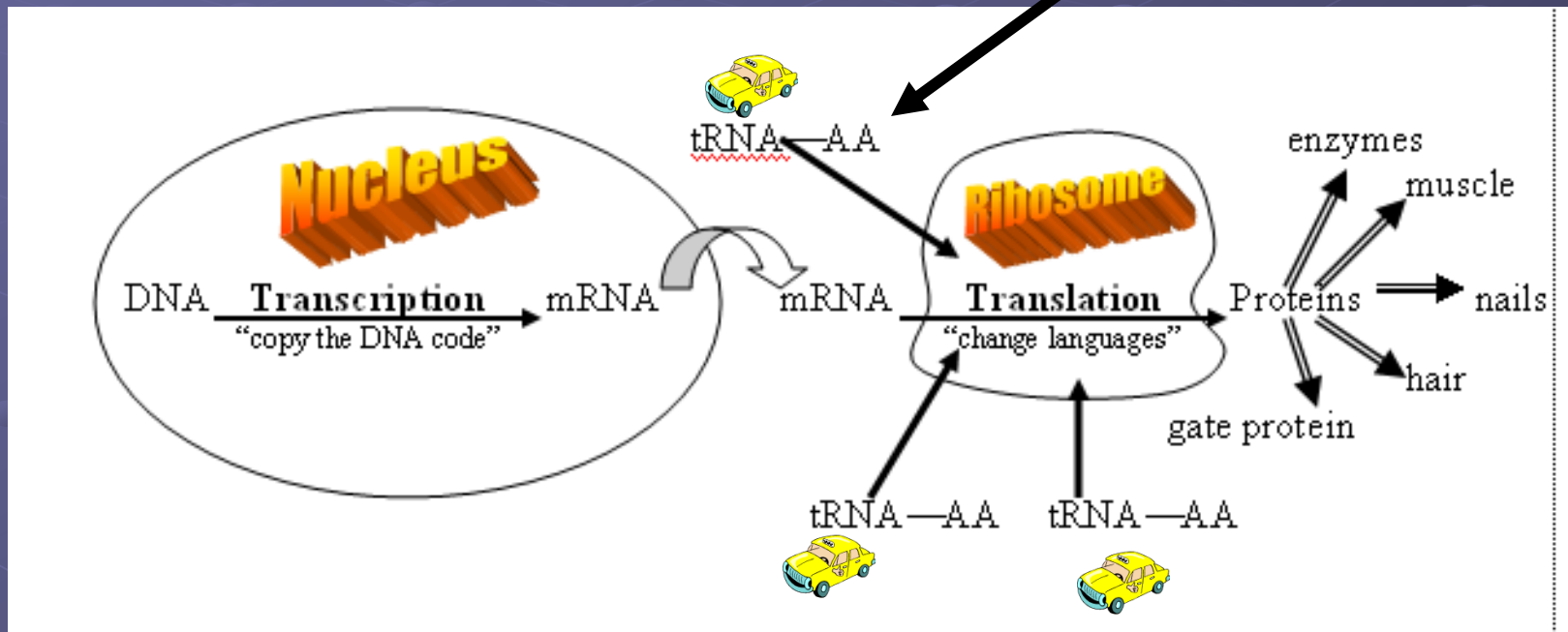
convert from mRNA language into protein language

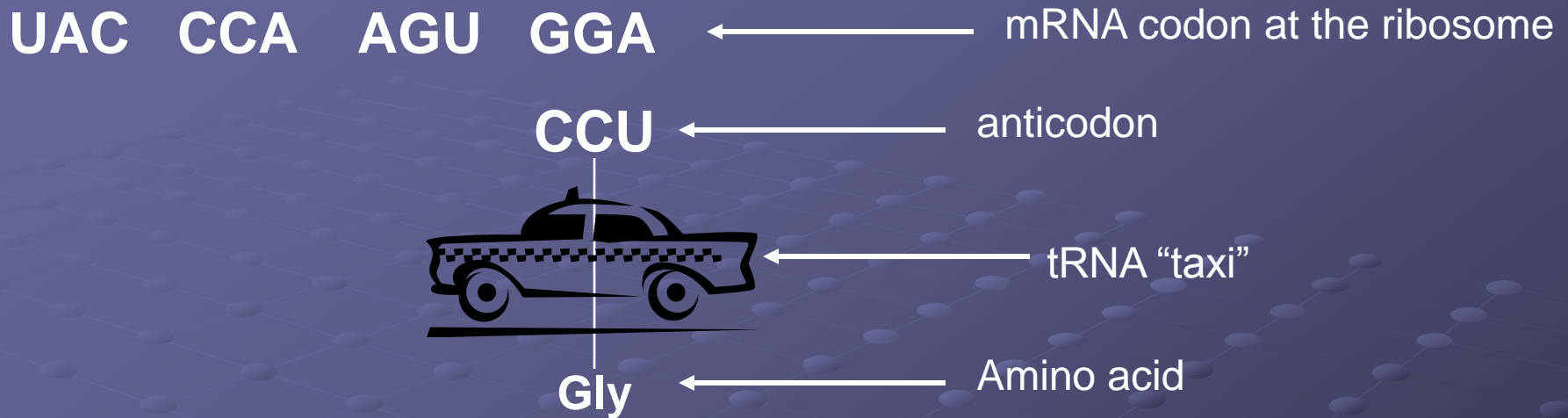
- The mRNA is read 3 letters at a time (CODON)
- Each CODON represents one specific Amino Acid
 - There are 64 possible 3 letter combinations BUT only 20 amino acids....
 - SO, some Codons code for more than one amino acid

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

Codons in mRNA					
First base	Second base				Third base
	U	C	A	G	
U	UUU Phenylalanine UUC UUA Leucine UUG	UCU Serine UCC UCA UCG	UAU Tyrosine UAC UAA Stop UAG	UGU Cysteine UGC UGA -Stop UGG-Tryptophan	U C A G
C	CUU Leucine CUC CUA CUG	CCU Proline CCC CCA CCG	CAU Histidine CAC CAA Glutamine CAG	CGU Arginine CGC CGA CGG	U C A G
A	AUU Isoleucine AUC AUA AUG-Start	ACU Threonine ACC ACA ACG	AAU Asparagine AAC AAA Lysine AAG	AGU Serine AGC AGA Arginine AGG	U C A G
G	GUU Valine GUC GUA GUG	GCU Alanine GCC GCA GCG	GAU Aspartic Acid GAC GAA Glutamic Acid GAG	GGU Glycine GGC GGA GGG	U C A G

- Once the mRNA reaches the ribosome, and the CODONS are read,
- Transfer RNA (tRNA) “Taxi” service delivers the correct Amino Acids to the ribosome





- tRNA binds to the mRNA CODON with its matching 3-letter AntiCODON
- tRNA releases its AA "passenger" which bonds to other AA to make a polypeptide
- the empty tRNA leaves the ribosome to pick up other AA passengers
- The protein is completed when a STOP codon is read

Translation

