

What are genes?

- ⦿ Coded DNA instructions
 - Control the production of proteins within a cell
 - Proteins control inherited traits
- ⦿ In order to understand the instructions, part of the DNA sequence must be copied into RNA

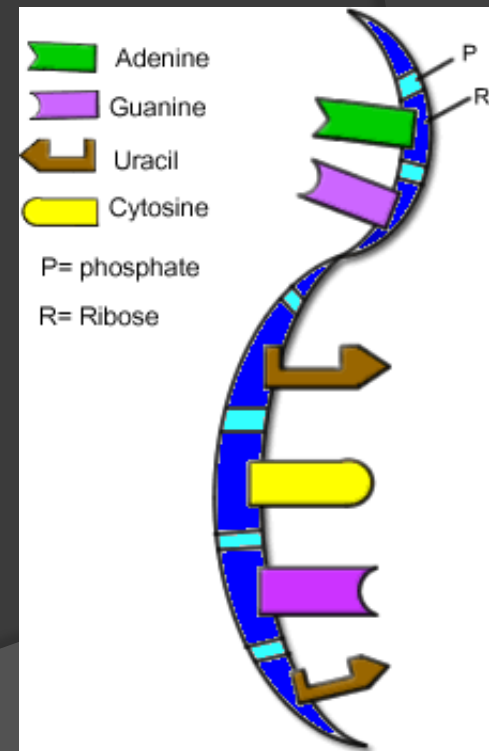
DNA Sequence

- ⦿ Specific order of nitrogenous bases
AGTTCAGGTC
- ⦿ Every 3 bases = CODON
- ⦿ Each codon directs the cell to place a specific amino acid (building blocks of proteins) in a certain location

RNA – ribonucleic acid

⦿ Differences in RNA from DNA:

1. Sugar in RNA is ribose
2. Single-stranded
3. Contains Uracil instead of Thymine



RNA

- ⦿ Main function – protein synthesis
 - Assembly of amino acids into proteins is controlled by RNA

3 Types of RNA:

1. Messenger RNA (mRNA)

- Carry copies of the instructions from DNA to the rest of the cell

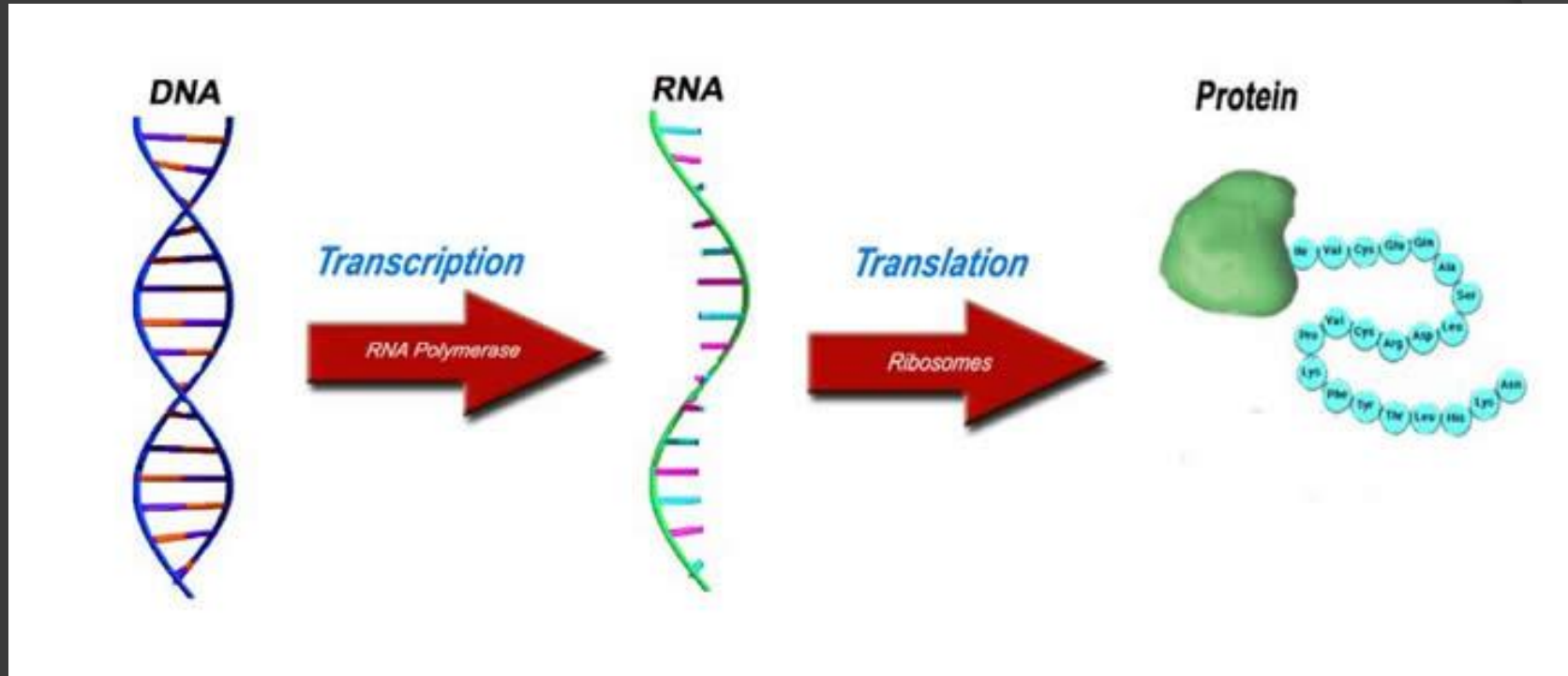
2. Ribosomal RNA (rRNA)

- Performs functions in the ribosome that allows for protein synthesis

3. Transfer RNA (tRNA)

- Transfers amino acids to the ribosome during protein synthesis

Central Dogma of Biology



Transcription – in Nucleus

- ⦿ Process in which part of the DNA sequence is copied into a complementary RNA sequence
 - **DNA to mRNA**
- ⦿ Requires an enzyme called RNA polymerase

Transcription

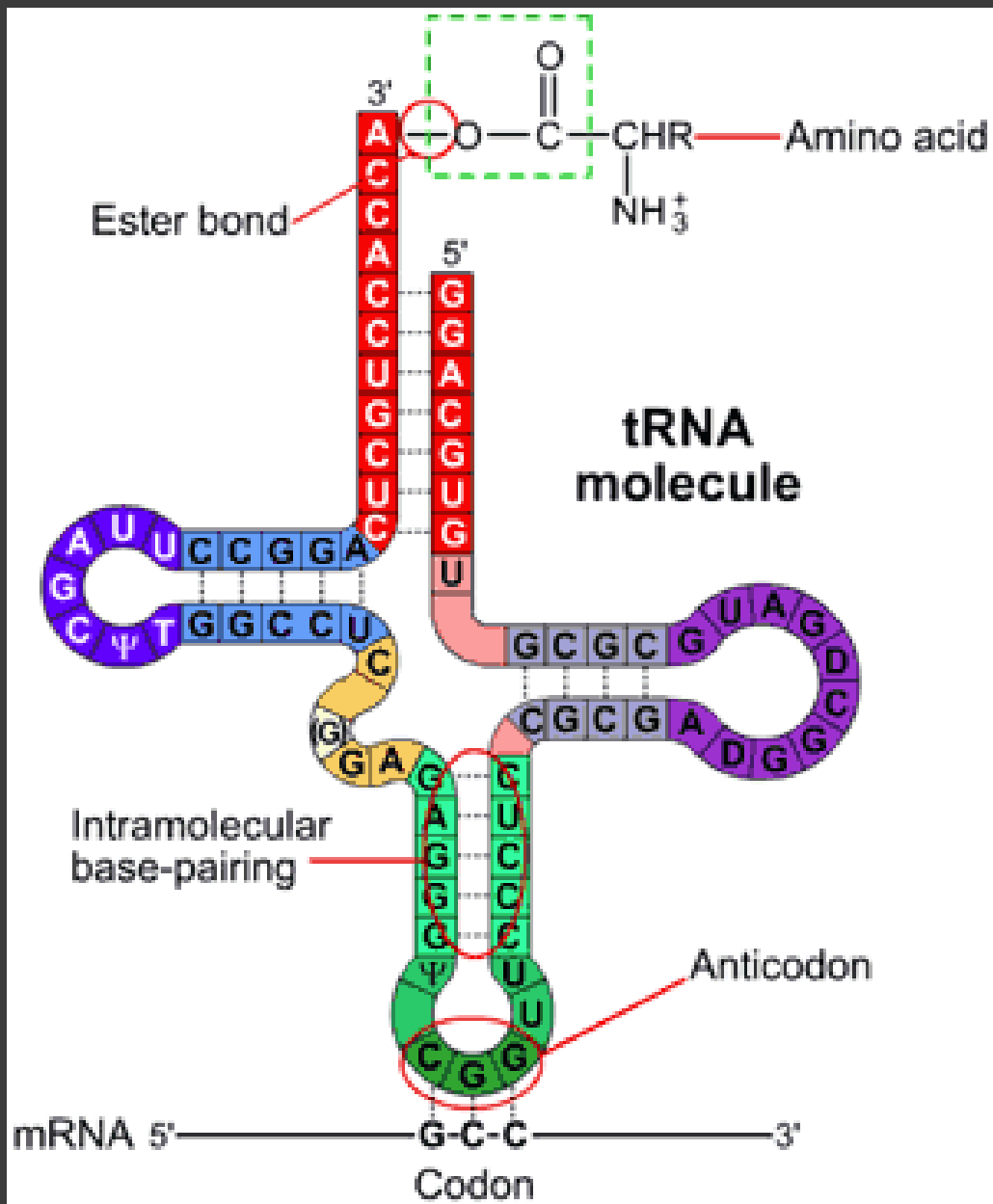
- ⦿ RNA polymerase binds to DNA and separates the strands
 - Uses 1 strand as a template
 - Nucleotides are assembled into a strand of RNA
 - **Remember – Uracil is substituted for Thymine**

Translation – in Ribosome

- ① Process of decoding a mRNA message into a protein
- ① mRNA has a start codon that attaches to the ribosome
 - Ribosome holds the mRNA and helps link amino acids together
- ① tRNA supplies the amino acids

How does tRNA know which amino acid to bring?

- Needs to bring the ANTICODON
 - = complementary to the codon on the mRNA



How are amino acids held together to form a protein?

- ◎ Peptide bonds!
 - Form polypeptide chains, which form proteins

End of Translation

- When the ribosome reaches the stop codon it releases the mRNA

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

Third Position