

Translation



Learning Objectives

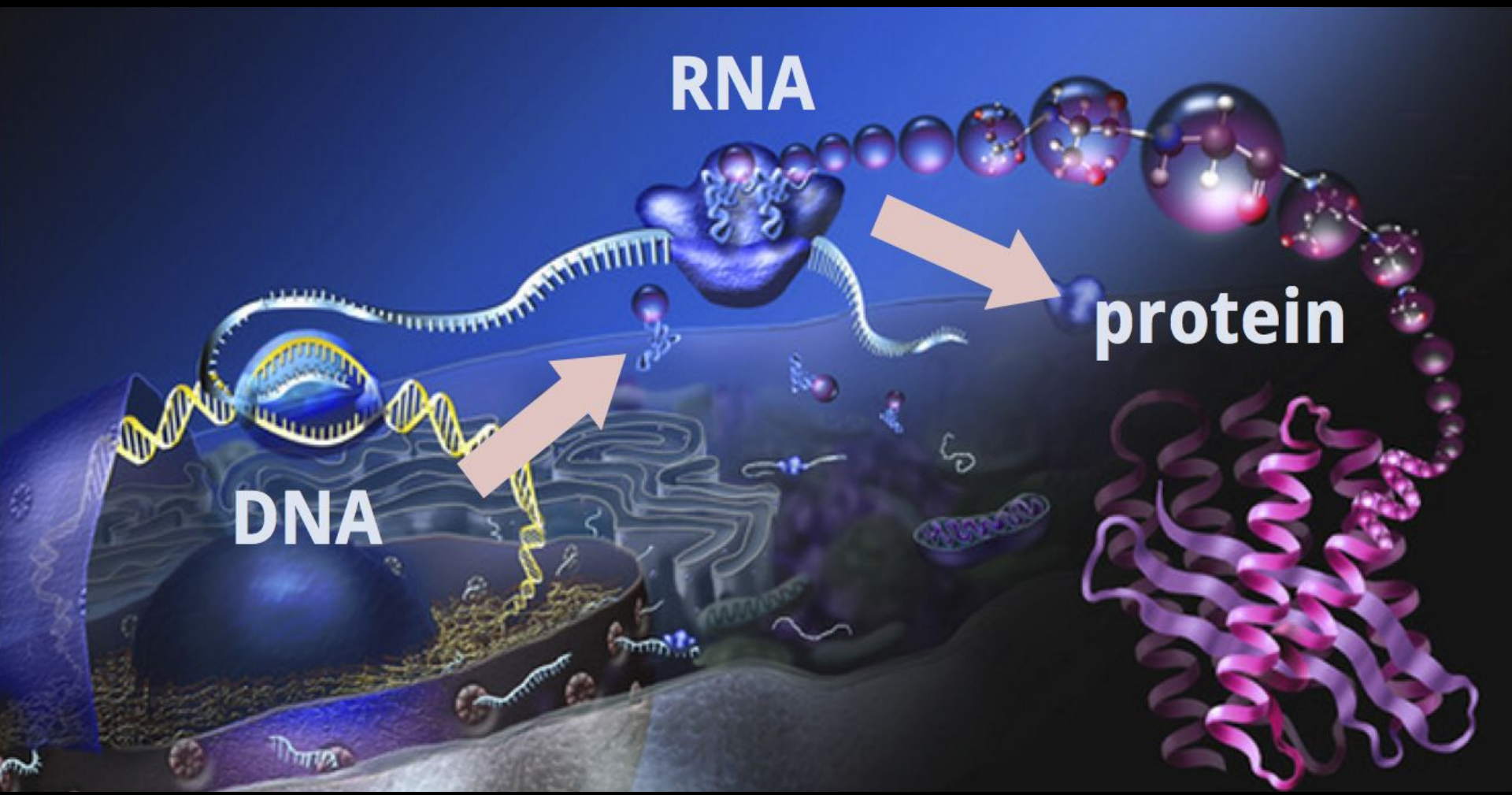
- Convert a mRNA codon into an amino acid

Central Dogma

(Nucleus)

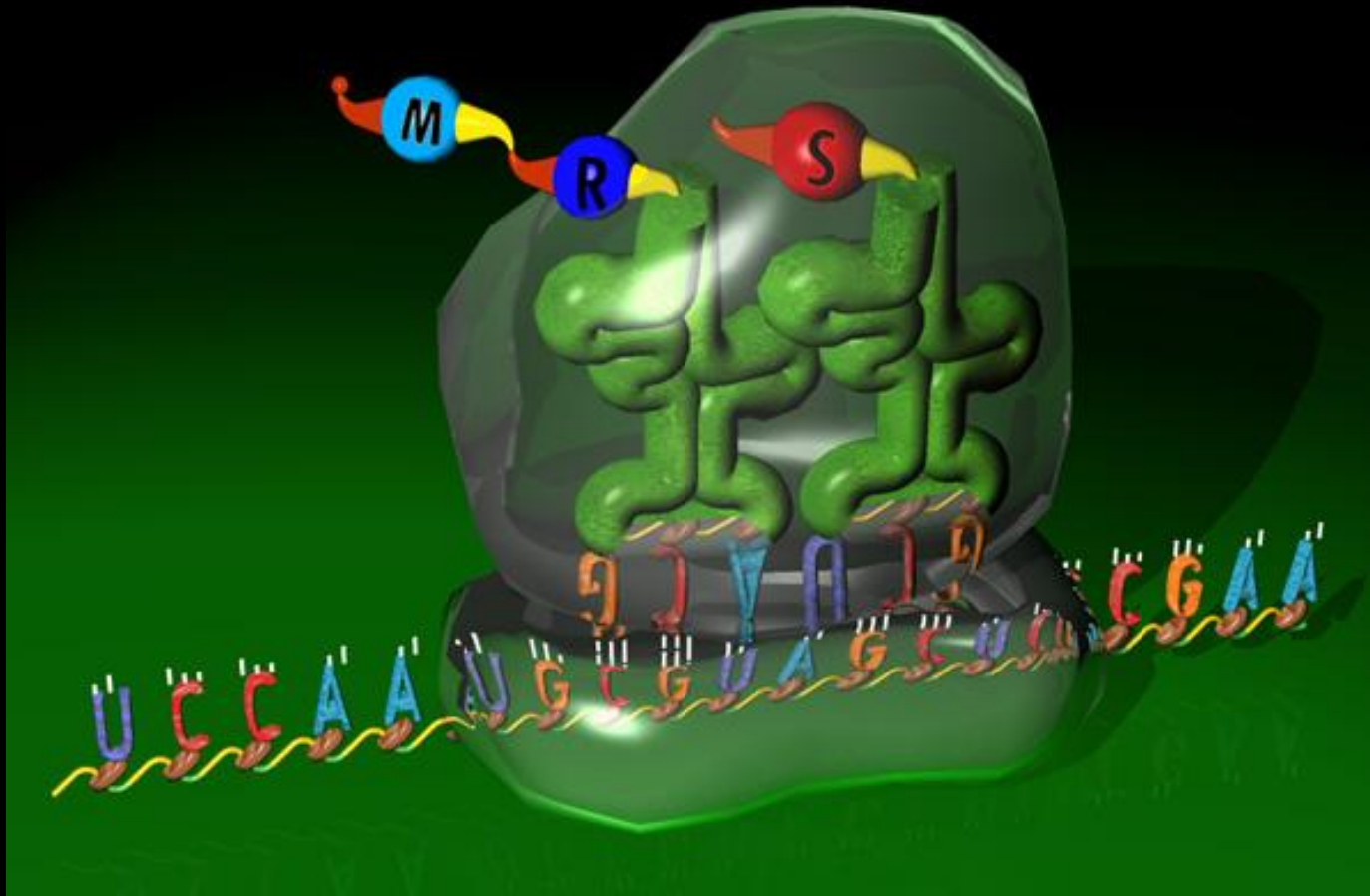
(Cytoplasm)

DNA → Transcription → RNA → Translation → Protein

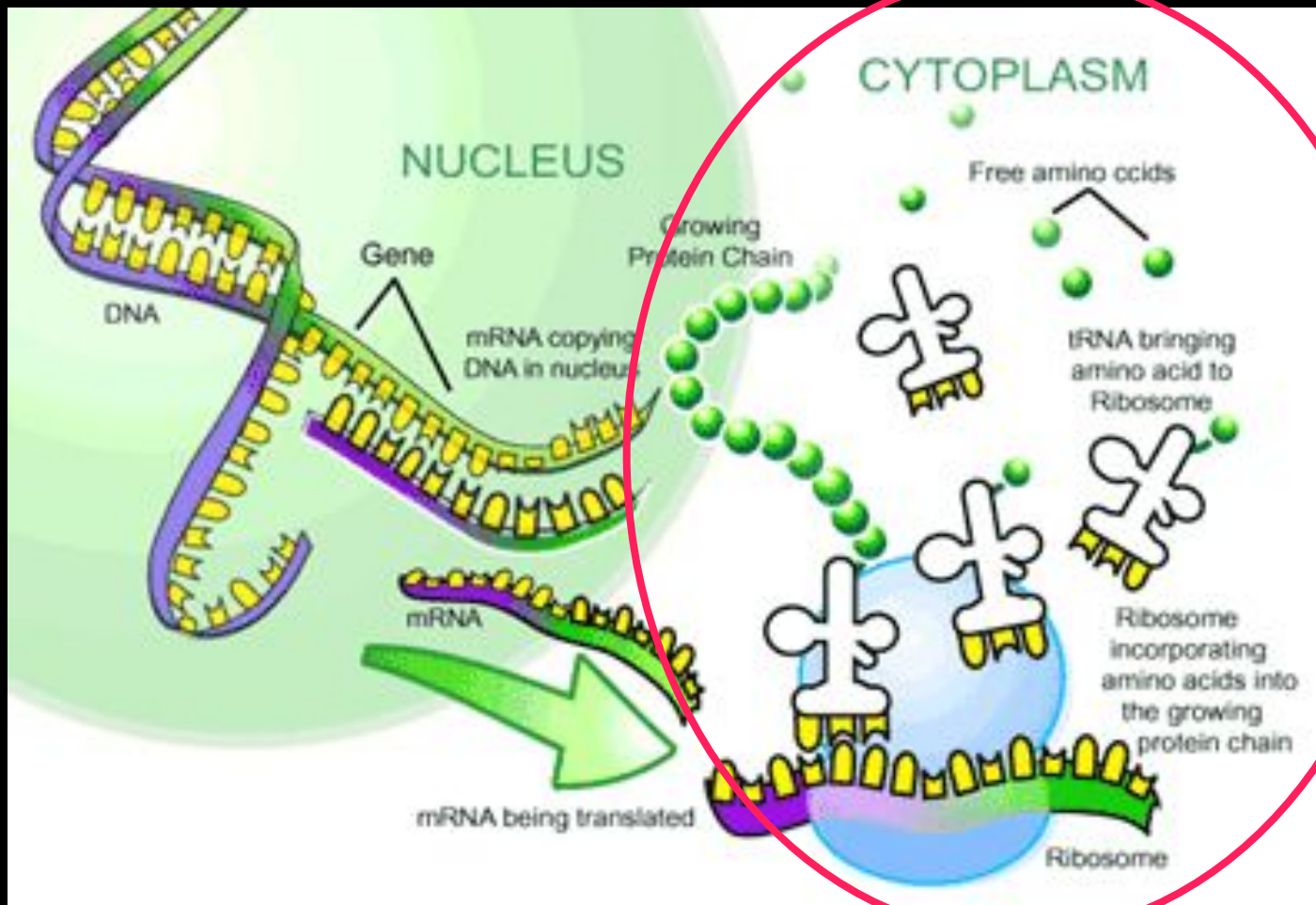


Translation

Translation = Conversion of mRNA into an amino acid sequence that makes a protein.

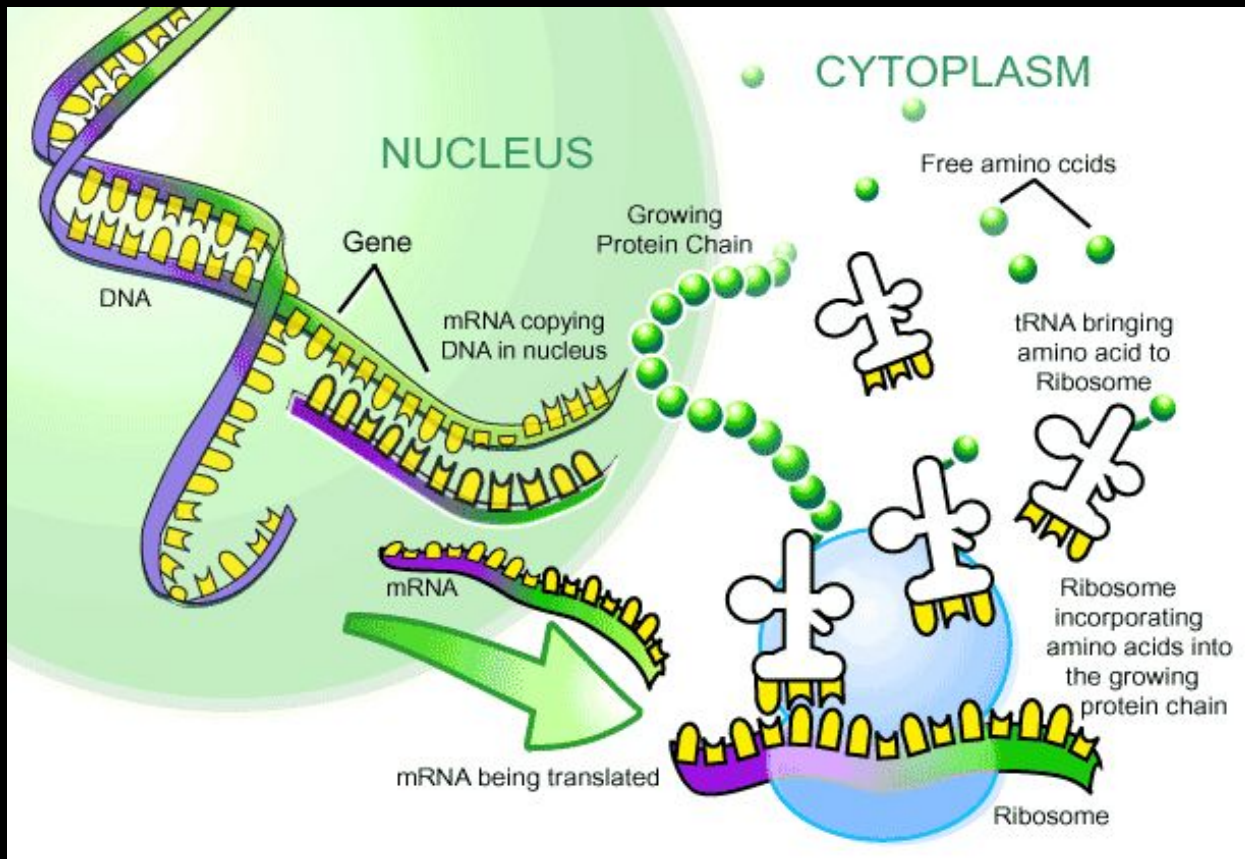


Where Does Translation Occur?



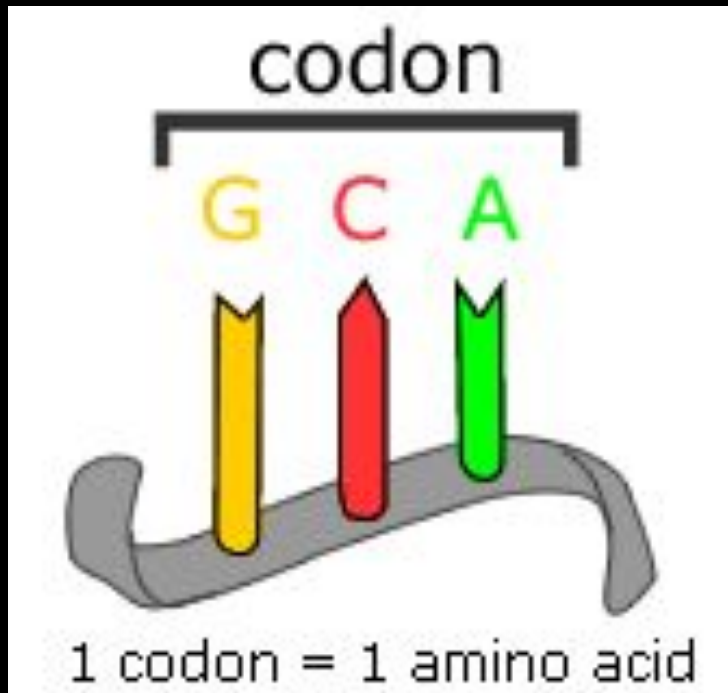
Translation occurs in the cytoplasm

Parts of the Translation Machinery



- mRNA
- tRNA
- Ribosome (rRNA)
- Amino acids

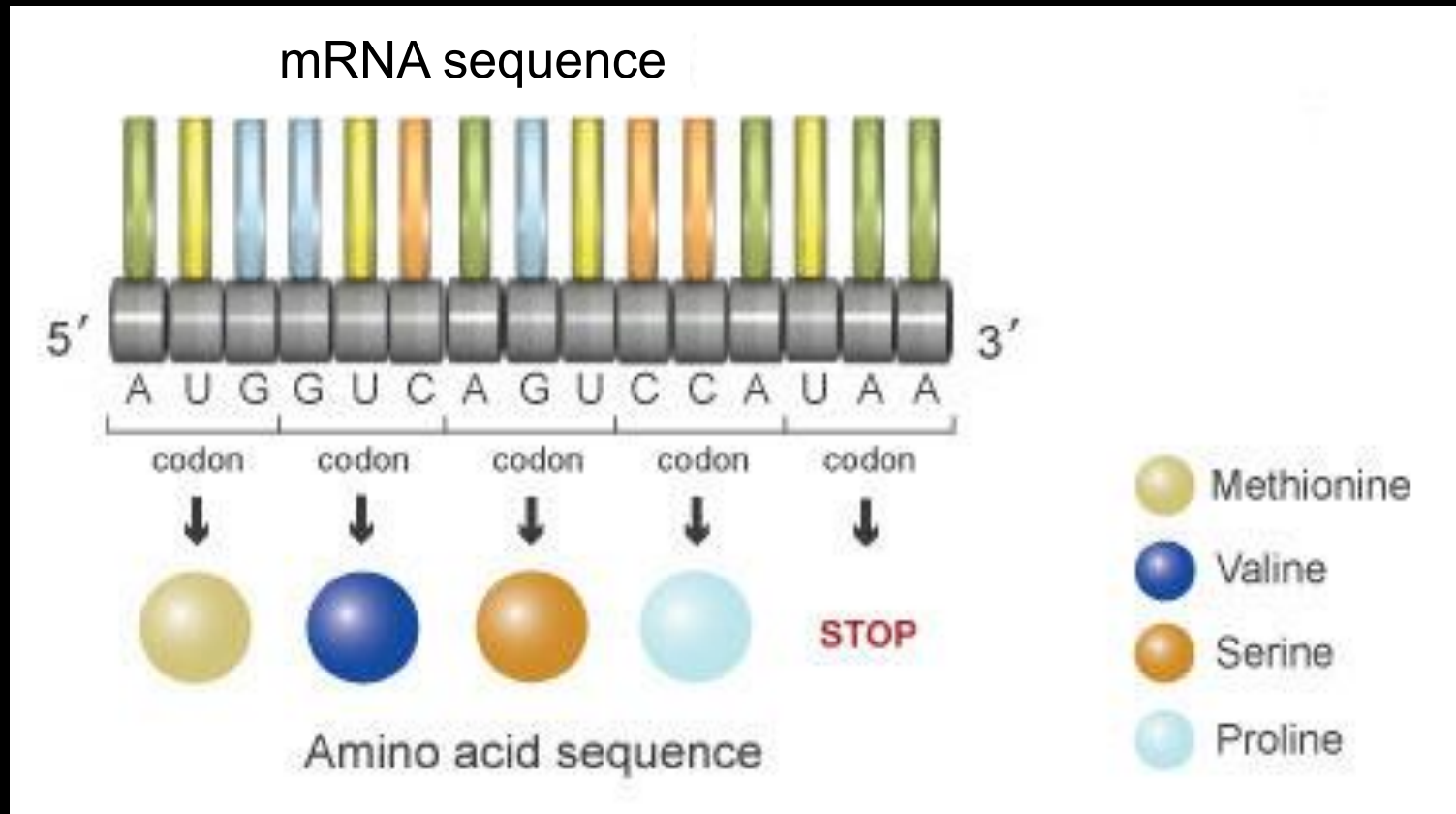
Translation of mRNA into Amino Acids



- The “words” of the DNA “language” are triplets of bases called CODONS

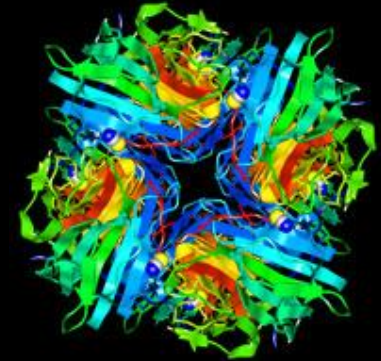
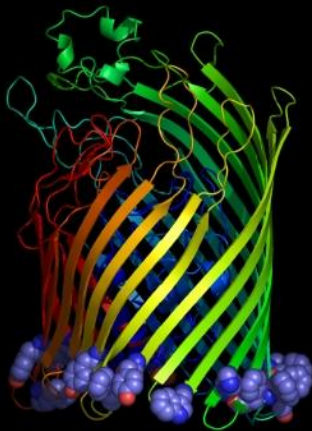
3 bases = 1 triplet = 1 codon - located on mRNA

Codons on mRNA



The order of codons in a gene specify the amino acid sequence of a protein.

Amino Acid Sequence



```
1      CTTCCGAGGAAGCTAAGGCCGCGTTGGGGTGAGGCCCTCACTTCATCCGGCGACTAGCACC GCGCCCGGCAGCGTCCGCT
81     CAGCTCTCGCCCGCACCATG GCC TCC GTC TCG GAG CTC GCT TGC ATC TAC TCG GCC CTC ATC CTG
1      M A S V S E L A C I Y S A L I L
146   CAC GAC GAT GAG GTG ACG GTC ACC GAG GAT AAG ATC AAT GCC CTC ATT AAA GCA GCG GGT
17    H D D E V T V T E D K I N A L I K A A G
206   GTG AAT GTT GAA CCT TTC TGG CCT GGC TTG TTT GCA AAG GCC CTG GCC AAC ATC AAC ATT
37    V N V E P F W P G L F A K A L A N I N I
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Every protein has a unique sequence of amino acids.

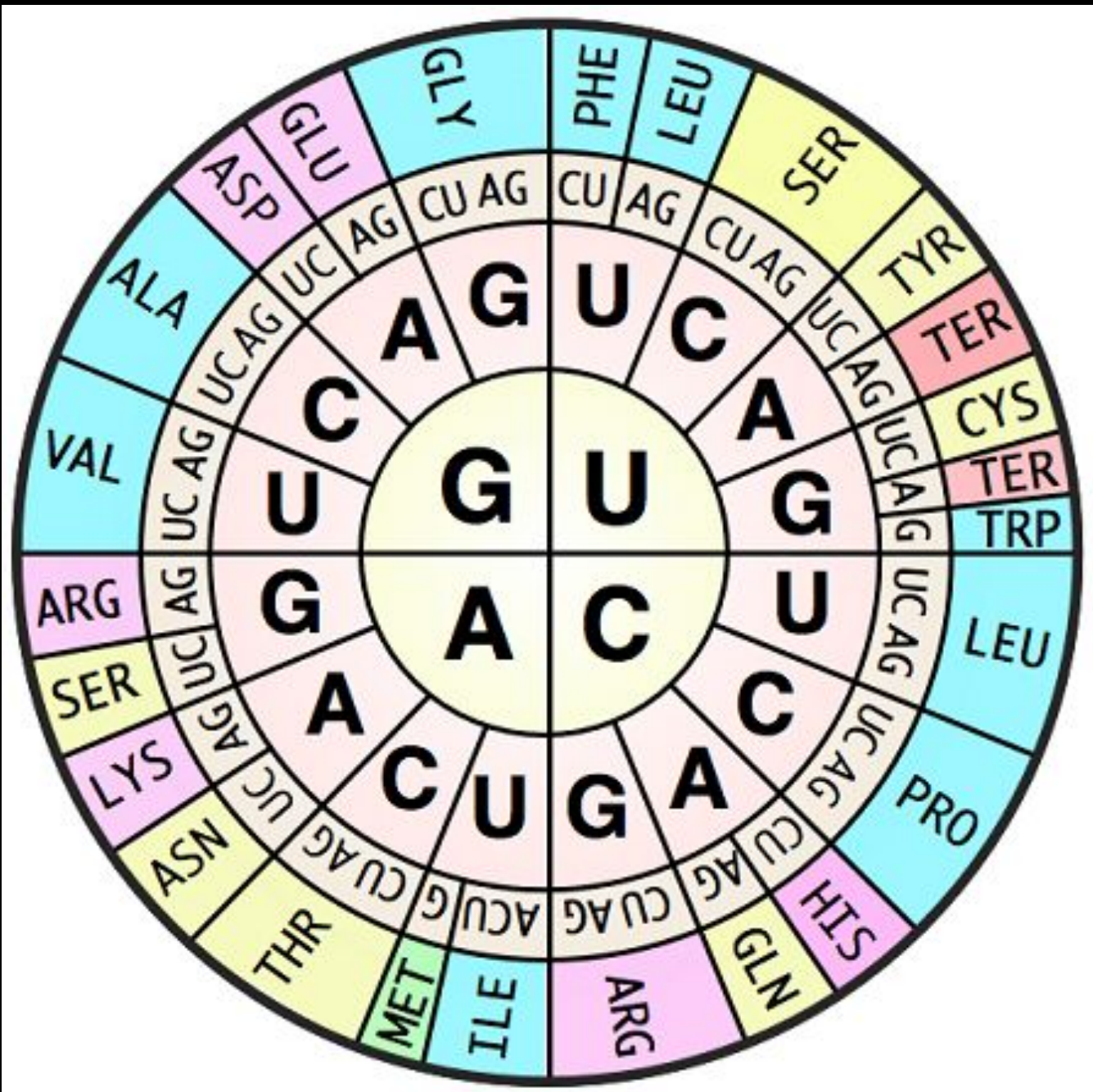
20 Amino Acids

Alanine	ala	A	Leucine	leu	L
Arginine	arg	R	Lysine	lys	K
Asparagine	asn	N	Methionine	met	M
Aspartic acid	asp	D	Phenylalanine	phe	F
Cysteine	cys	C	Proline	pro	P
Glutamine	gln	Q	Serine	ser	S
Glutamic acid	glu	E	Threonine	thr	T
Glycine	gly	G	Tryptophan	trp	W
Histidine	his	H	Tyrosine	tyr	Y
Isoleucine	ile	I	Valine	val	V

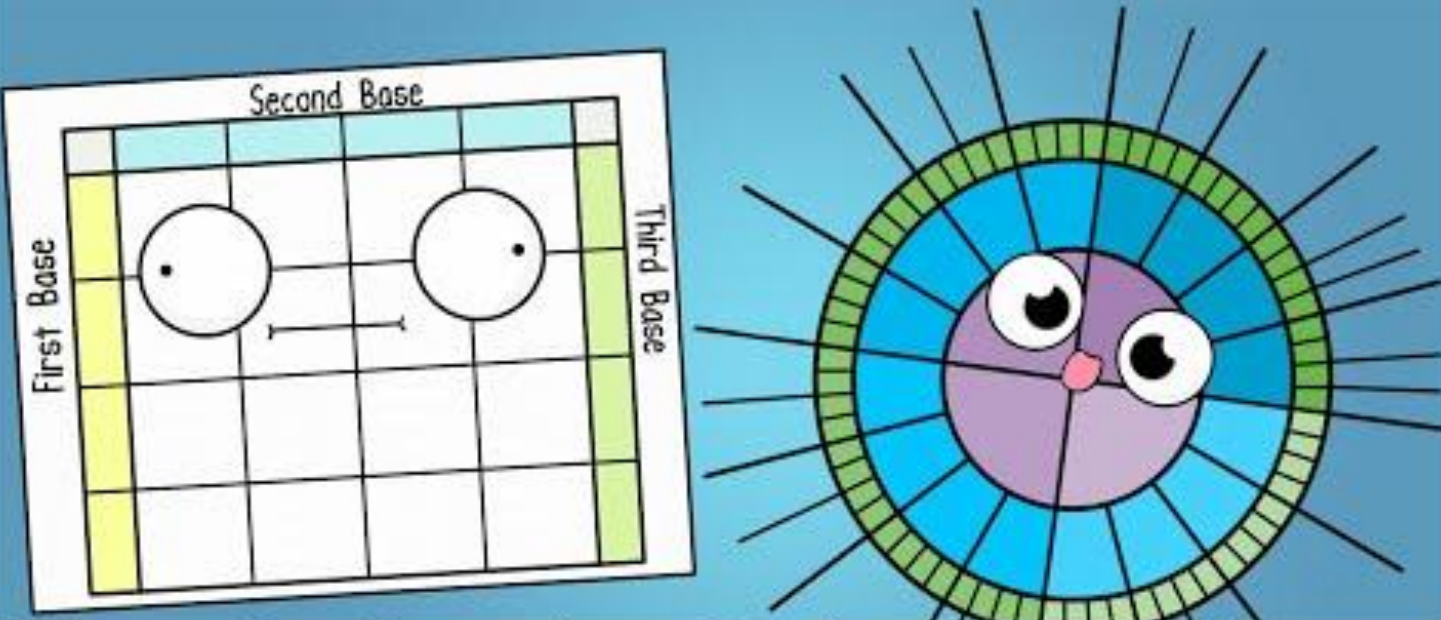
The Genetic Code

		Second Position									
		U		C		A		G			
		code	Amino Acid	code	Amino Acid	code	Amino Acid	code	Amino 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	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	

The codon is either translated into an amino acid or serves as a start/stop signal.



YouTube Video



The image features two main components. On the left is a codon chart, a 4x4 grid with a yellow vertical bar on the left labeled 'First Base', a light blue horizontal bar at the top labeled 'Second Base', and a light green vertical bar on the right labeled 'Third Base'. Two white circles with dots inside are placed in the top row, with a double-headed arrow between them. On the right is a cartoon amoeba character with a purple body, large white eyes with black pupils, a pink nose, and a green outer ring with radiating lines.

How to Read a Codon Chart
with the Amoeba Sisters

Stop Here

