

Chapter 4

Use with Section 3

ENRICHMENT

● DNA

The Genetic Code

How does the cell know which proteins to make? Each protein has a different amino acid sequence. The amino acids and the order they are arranged in are determined by the DNA code in the nucleus of the cell. The code for proteins leaves the cell nucleus on messenger RNA.

Scientists know from experiments and observation that the code on the mRNA for each amino acid is made of three bases. Each group of three bases is called a codon. The mRNA brings the codons to the ribosome, where proteins are assembled into a chain using amino acids from the cytoplasm. Because there are four bases in RNA, and each codon is made of three bases, there are 64 possible codons. Three of these give a signal to stop instead of coding for an amino acid. One of the codons, AUG (adenine-uracil-guanine), is the code for an amino acid called methionine (met), which starts all proteins.

Look at the genetic code dictionary below. You will notice that most amino acids are specified by more than one codon. Some codons like UUU and UUC code for the same amino acid, phenylalanine (phe). In the dictionary, abbreviations are given for all the amino acids.

Genetic Code Dictionary					
First base in the codon	Second base in the codon				Third base in the codon
	U	C	A	G	
U	Phe	Ser	Tyr	Cys	U
	Phe	Ser	Tyr	Cys	C
	Leu	Ser	STOP	STOP	A
	Leu	Ser	STOP	Trp	G
C	Leu	Pro	His	Arg	U
	Leu	Pro	His	Arg	C
	Leu	Pro	Gln	Arg	A
	Leu	Pro	Gln	Arg	G
A	Ile	Thr	Asn	Ser	U
	Ile	Thr	Asn	Ser	C
	Ile	Thr	Lys	Arg	A
	(START) Met	Thr	Lys	Arg	G
G	Val	Ala	Asp	Gly	U
	Val	Ala	Asp	Gly	C
	Val	Ala	Glu	Gly	A
	Val	Ala	Glu	Gly	G

1. Using the genetic code dictionary, draw a diagram of mRNA showing the codons for an imaginary protein having three amino acids. Include start and stop signals.

2. Show how a change in one base will affect the protein you have designed.
