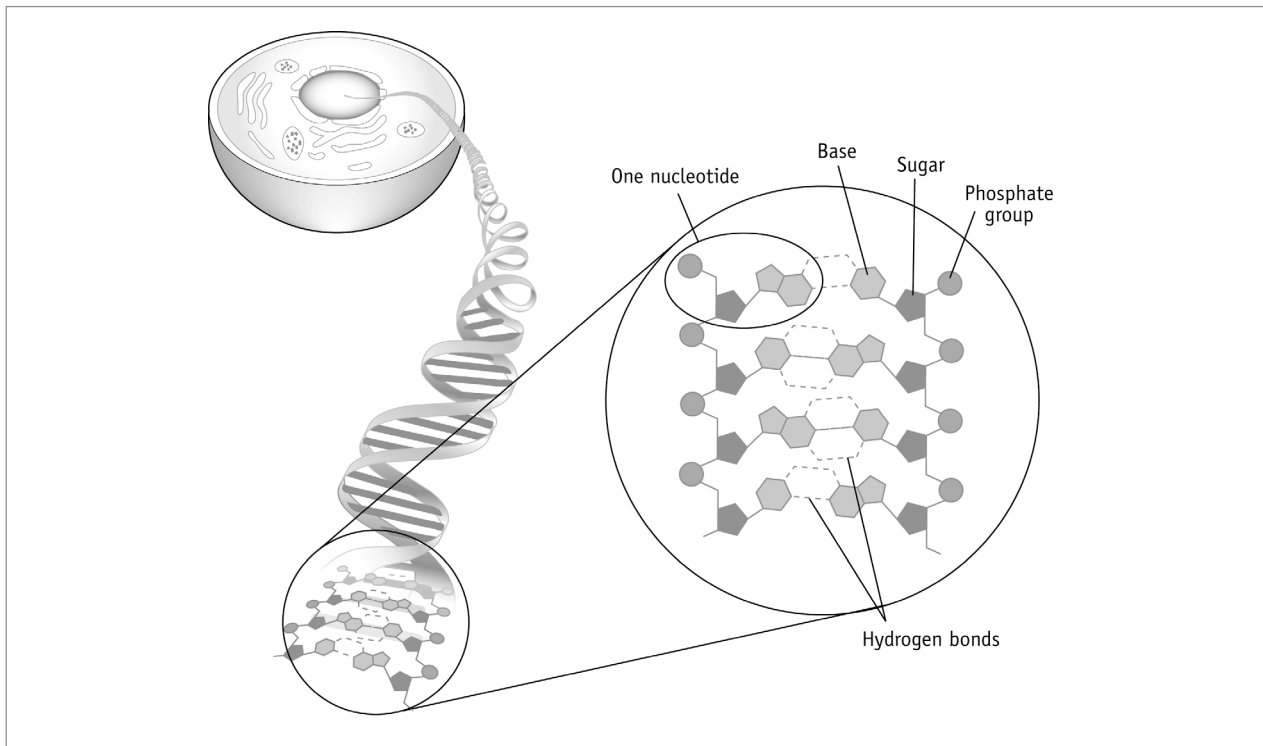


Nucleic acids and protein synthesis

1 and 2



▲ Diagram of a DNA molecule.

3

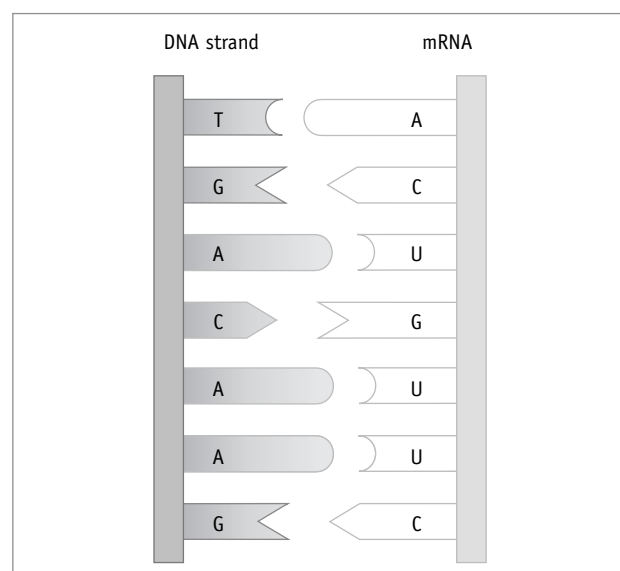
Strand 1	C	C	T	G	A	A	T	C	C	G	A	T
Strand 2	G	G	A	C	T	T	A	G	G	C	T	A

- 4 During protein synthesis, the sequence of bases on the DNA is copied by complementary base-pairing of mRNA nucleotides in a process called transcription.

5

	DNA	mRNA
Sugar present in nucleotides	deoxyribose	ribose
Number of strands in molecule	2	1
Bases present in nucleotides	A G C T	A G C U

6

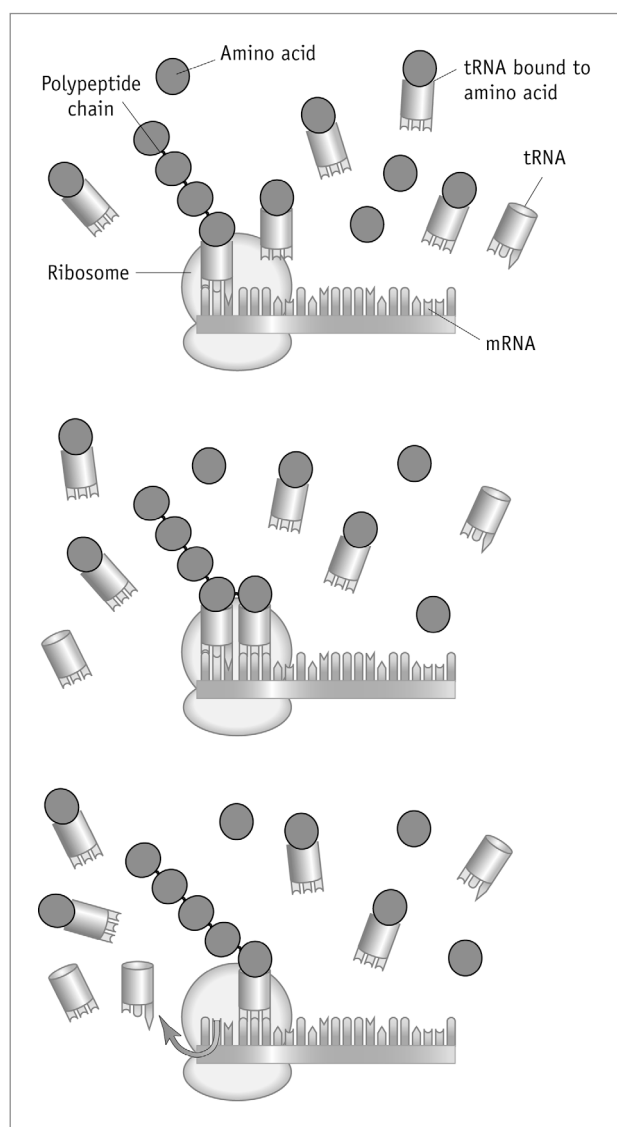


Teacher/Lecturer notes

7

Amino acid code	Val			His			Leu			Thr			Pro			Glu		
Codons	G	U	U	C	A	U	U	U	A	A	C	U	C	C	U	G	A	A
	G	U	C	C	A	C	U	U	G	A	C	C	C	C	C	G	A	G
	G	U	A				C	U	U	A	C	A	C	C	A			
	G	U	G				C	U	C	A	C	G	C	C	G			
							C	U	A									
							C	U	G									

7



- i** tRNAs attach to free amino acids in the cytoplasm. The amino acids correspond to the anticodons on the tRNAs.

mRNA binds to ribosome.

The tRNA transfers the amino acid to the ribosome, where the anticodon on the tRNA binds with the complementary codon on the mRNA.

A second tRNA binds with the mRNA on the ribosome, and a peptide bond forms between the two attached amino acids.

The ribosome moves along to the next codon on the mRNA, and on tRNA is detached.

(This tRNA will go and bind with another amino acid in the cytoplasm.)

The free binding site on the ribosome is now available for another tRNA to attach to.

Each time the ribosome moves along, an amino acid is added to the growing polypeptide chain.

8 CTT

- 9 i** The amino acid in the position determined by this codon is normally Glu (glutamine). With the mutation, Glu will be replaced by Val (valine).

- ii** The primary structure affects the bonding that occurs between the R groups in the polypeptide chain. This affects the folding, and so the 3-D structure of the protein.

- iii b**, This is because if the mutation is inherited, it must be present in the gametes, so must have occurred in the replication of DNA before a cell division that produced the gametes. A discussion of exactly when the mutation occurred could include – DNA replication before mitosis of early embryo, so that a high proportion or all the cells of the embryo, including the gametes even, have the mutation, or during DNA replication before meiosis when gametes are formed, so that the resulting zygote contains the mutation.