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7.3 Translation

Medium

BIOLOGY

IB HL

EXAM PAPERS PRACTICE

7.3 Translation

Question Paper

Course	DP IB Biology
Section	7. Nucleic Acids (HL Only)
Topic	7.3 Translation
Difficulty	Medium

Time allowed: 20

Score: /10

Percentage: /100

Question 1

What is the correct sequence of events during the initiation stage of translation in eukaryotes?

I. Small subunit of the ribosome binds to the 5' end of mRNA
II. Large ribosomal subunit binds to form the ribosome complex
III. The ribosomal subunit moves along the mRNA until it locates a start codon
IV. An initiator tRNA binds
V. Elongation of the polypeptide chain can begin

	first	→	→	→	last
A	I	II	III	V	IV
B	II	I	IV	III	V
C	I	II	III	IV	V
D	I	IV	III	II	V

[1 mark]

Question 2

Which of the following is **not** a function of tRNA?

A. Helps translate anticodons into amino acids

B. Peptide bond formation linking amino acid to a polypeptide chain

C. Carrying a specific amino acid to the ribosome

D. Recognising codons on mRNA

[1 mark]

Question 3

During the **elongation** stage of translation the ribosome 'translocates' along the mRNA moving in a 5' → 3' direction.

What is the immediate effect of this directional movement?

A. The tRNA occupying the P site moves to the A site

B. The E site becomes free

C. The tRNA occupying the A site moves to the P site

D. The polypeptide chain is released from the ribosome

[1 mark]

Question 4

Which statements best describe ribosomes?

I. They are composed of protein and ribosomal RNA

II. They are found in both eukaryotes and prokaryotes

III. Ribosomal RNA provides structure

IV. They consist of two equal-sized subunits

A. I only

B. I and II

C. I, II and III

D. I, II and IV

[1 mark]

Question 5

In eukaryotic cells, ribosomes can be either free or bound.

Which of the following proteins would most likely be synthesised by bound ribosomes?

A. Mitochondrial outer membrane protein

B. Glyceraldehyde 3-phosphate dehydrogenase involved in glycolysis

C. Lysosomal acid lipase

D. Histone protein

[1 mark]

Question 6

In prokaryotes, the processes of transcription and translation are said to be coupled, which means they can proceed simultaneously.

Which is the **key** cellular feature of prokaryotes that allows this to happen?

A. Circular chromosomal DNA

B. Free ribosomes

C. The lack of a nucleus

D. The presence of introns in prokaryotic DNA

[1 mark]

Question 7

The bacterium *Staphylococcus aureus (S. aureus)* is one of the main human pathogens and can cause many serious infectious diseases. Mutations in the *mec A* gene has allowed *S.aureus* to become resistant to many antibiotics. The table below shows a (Clustal W) partial nucleotide sequence alignment of *mec A* for different isolates of *S. aureus*. The drug resistant strain has a base substitution mutation (shown in bold) which changes the amino acid residue from serine to threonine.

S. *aureus* isolate 1	AAC GGA ACC GGT AAG GAC GCG ATC ACC AGC
S. *aureus* isolate 2	AAC GGA ACC GGT AAG GAC GCG ATC ACC AGC
S. *aureus* isolate 3	AAC GGA ACC GGT AAG GAC GCG ATC ACC AGC
Drug resistant strain	AAC GGA ACC GGT AAG GAC GCG ATC ACC A**C**C

Which of the following statements **most likely** explains how an amino acid change can cause antibiotic resistance?

A. Alteration of the drug target site which prevents binding

B. Prevents the bacterial cell from synthesising the target protein

C. Bacteria produce less of the target protein

D. Can introduce a stop codon

[1 mark]

Question 8

Which interactions or features differentiate tertiary structure from secondary structure in proteins?

I. Hydrogen bonds
II. Disulphide bridges
III. Hydrophobic interactions
IV. Alpha-helices
V. Interactions between R-groups of amino acids

A. I and II

B. II and V

C. II, III and IV

D. II, III and V

[1 mark]

Question 9

Which of the following best describes the quaternary structure of proteins?

A. The three-dimensional structure of a polypeptide chain

B. Arrangement of beta-pleated sheets

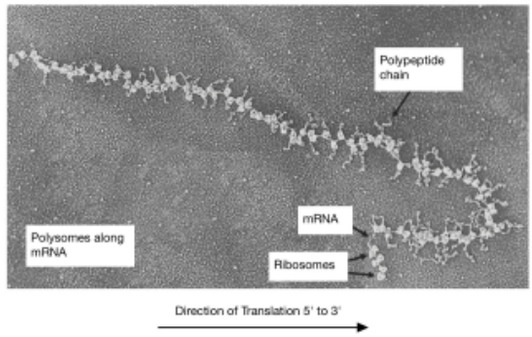
C. The linear sequence of amino acids

D. How polypeptide chains are arranged

[1 mark]

Question 10

The diagram below represents an electron micrograph of eukaryotic polysomes.



What is the main advantage that polysomes give to a eukaryotic cell?

A. Translation can be initiated before transcription is complete

B. Allows very long mRNA molecules to be translated

C. They increase the overall rate of translation

D. Allows structurally different polypeptides to be produced from the same mRNA

[1 mark]