

Question 1 Translation

Here is a sequence (180 bases) from the baker yeast (*Saccharomyces cerevisiae*) genome. This sequence is located directly downstream from a promoter: it is a transcribed sequence. The sequence of the coding strand is given below: the mRNA produced by transcription has the same sequence, except for T replaced with U. There is no intron in this sequence.

1060

5' c a c c c g a a a c g a c g t c g t a a g t c c c g t t c a g g g c c t t c g t t c t c a c g g t a t a a c c a t g a t
 c g g t g a c c g a a c t t t c a g c t g t c t c a t g g t g c c a a c g t c a a g c g a a g c g g g g g t t g t t g t
 t g c g a g a a t g t a t c c t t a g c a t g a t g c t g g c g g c g c c a c g c a a a t t t t c t g a g t g t a t t t 3'

1.1 What is the size in amino acids of the protein encoded by this sequence ?

1.2 What is the size of the protein when the only mutation introduced into the sequence is at position 20 : A is replaced by T (20 a → t)

1.3 What is the size of the protein when the only mutation introduced into the sequence is at position 56 : A is replaced by T (56 a → t)

1.4 What is the size of the protein when the only mutation introduced into the sequence is at position 64 : T is replaced by A (64 t → a)

1.5 What is the size of the protein when the only mutation introduced into the sequence is at position 82 : T is replaced by A (82 t → a)

1.6 What is the size of the protein when the only mutation introduced into the sequence is at position 166 : a T is added during DNA replication by stuttering

caaattttct → caaattttct

1.7

You want to PCR amplify the sequence given above. To do that you have to order 20 nucleotides long primers. Indicate the sequences of the primers you order to do the PCR :

Sequence of primer 1 : 5' _____ 3'

Sequence of primer 2 : 5' _____ 3'

Question 2

During translation, the energy cost of one round of elongation is

- A. 1 ATP
- B. 1 GTP
- C. 3 ATP
- D. 1 ATP + 2 GTP
- E. 2 ATP + 2 GTP

Question 3

Amino acids are attached to

- a. the 3' end of tRNA
- b. the 5' end of tRNA

Question 4

What amino acid should be attached to a tRNA with the anticodon sequence 5'-UGA-3' ?

Question 5

When one of the enzymes linking amino acids to tRNA makes a mistake (e.g. an Alanine is linked to a tRNA with a 5' CCC 3' anti-codon assigned to Glycine), what is the consequence?

- a. the tRNA will not participate to translation because it will be unable to bind eEF-1.
- b. the tRNA will not participate to translation because it will be unable to bind eEF-2.
- c. the tRNA will not participate to translation because it will be rejected by the ribosome.
- d. the tRNA will participate to translation and an Alanine will be incorporated instead of a Glycine in one protein.

		Second mRNA base						
		U	C	A	G			
U	UUU	Phe	UCU	Ser	UAU	Tyr	UGU	Cys
	UUC		UCC		UAC		UGC	
	UUA	Leu	UCA	UAA	Stop	UGA	Stop	
	UUG		UCG	UAG	Stop	UGG	Trp	
C	CUU	Leu	CCU	Pro	CAU	His	CGU	Arg
	CUC		CCC		CAC		CGC	
	CUA	CCA	CAA	Gln	CGA	Arg		
	CUG	CCG	CAG	CGG				
A	AUU	Ile	ACU	Thr	AAU	Asn	AGU	Ser
	AUC		ACC		AAC		AGC	
	AUA	ACA	AAA	Lys	AGA	Arg		
	AUG	Met or start	ACG	AAG	AGG			
G	GUU	Val	GCU	Ala	GAU	Asp	GGU	Gly
	GUC		GCC		GAC		GGC	
	GUA	GCA	GAA	Glu	GGA	Gly		
	GUG	GCG	GAG	GGG				