CHNOPS

Simulating Protein Synthesis





This page has all the information you need to complete the CHNOPS assignment.

Base Pairing Rules for Transcription and Paring of Codon to Anti-Codon

tRNA Anti-Codons and the Amino Acid they carry

Amino Acid Sequences and the Protein they produce.

Key to CHNOPS	Figure I	
tRNA Triplet	Amino Acid Number	Animo Acids
CCC	1	11-2-3
CGA	2	11-3-2
CGC	3	13-15-10
AAC	4	16-2
GGG	5	20-11-13
AUC	6	20-12-13
AGG	7	6-8-10
AAA	8	3-2-1
UUU	9	10-9-4
CUA	10	12-7-8-1
GGA	11	20-1-6
GGU	12	6-6-14
UAU	13	9-15-14
AGU	14	9-8
UAC	15	11-3-3
AGC	16	10-19-7-6
UAG	17	16-19-2-4
GAG	18	10-4-9
AUA	19	5-7-8-1
ACC	20	13-14-15
		9-4
Example:		14-18-17
Gene X		20-7-8-1
DNA ACC-GGT-T	TAT	14-7-14-12
mRNA		
tRNA		Base Pairing Rules for
Amino Acids		DNA mRNA
Trait		A> U
		T> A

3-2-1	Little Head
10-9-4	Long Neck
2-7-8-1	Long Nose
20-1-6	No Fangs
6-6-14	No Horns
9-15-14	No Toes
9-8	Not Spotted
11-3-3	Orange
0-19-7-6	Plump
6-19-2-4	Red Ears
10-4-9	Short Neck
5-7-8-1	Short Nose
3-14-15	Skinny
9-4	Spotted
4-18-17	Toes
20-7-8-1	Two Legs
1-7-14-12	Yellow Ears
Pairing Rules for	DNA and RNA
mRN.	A tRNA
> U -	> A
> A -	> U
> G -	> C
> C -	> G

С

Figure 2 Trait Big Head

> Blue Fangs

Four Legs Hairless

> Hairy Horns

Follow the instructions on the next pages to complete your Example: Gene X

Once you have completed the examp complete all 12 genes on your subject #.

Finally, draw what you think your organism looks like

ext	Base Pairing Rules for DNA and RNA				
	DNA		mR	NA	tRNA
ampla	А	>	U	>	А
ampie,	т	>	A	>	U
	C ·	>	G	>	С
	G	>	С	>	G
Exampl	e:				
Gene X					
DNA A	4CC-0	GT-TA	T		
mRNA					
tRNA					
Amino A	cids				
Trait					

In this step, you will look at the DN molecule that you are given and wri the mRNA nucleotide that pairs with below.

In the Example, your first DNA nucleotide is A Below it write U because A – U in Transcription

Δ	Base Pairing Rules for DNA and RNA				
A	DN/	A ml	RNA	tRNA	
DNA write	А	> U		> A	
with it	т	> A		> U	
	С	> G		> C	
ſ	G	> C		> G	
Examp	ole:				
Gene X					
DNA	ACC	C-GGT-TAT	-		
mRNA	U				
tRNA					
Amino	Acid	S			
Trait					

In the Example, the second DNA nucleotide is C. Below it write G because C-G in Transcription.



In the Example, the third DNA nucleotide is also C. Below it write G because C-G in Transcription.



In the Example, the fourth DNA nucleotide is G. Below it write C because G-C in Transcription.



In the Example, the fifth DNA nucleotide is also G. Below it write C because G-C in Transcription.



In the Example, the sixth DNA nucleotide is T. Below it write A because T-A in Transcription.



In the Example, the seventh DNA nucleotide is also T. Below it write A because T-A in Transcription.



In the Example, the eighth DNA nucleotide is A. Below it write U because A-U in Transcription.



In the Example, the ninth and last DNA nucleotide is T. Below it write A because T-A in Transcription.

You have now completed the process of Transcription for the Gene X



In the example, the first mRNA nucleotide is U. Below it write A because U-A when codons and anticodons pair-up during translation.



Gene X	
DNA	ACC-GGT-TAT
mRNA	UGG - CCA - AUA
tRNA	<u>A</u>
Amino	Acids
Trait	

In the example, the second mRNA nucleotide is G. Below it write C because G-C when codons and anticodons pair-up during translation.



-	
Gene X	7 N
DNA	ACC-GGT-TAT
mRNA	UGG - CCA - AUA
tRNA	AC
Amino	Acids
Trait	

In the example, the third mRNA nucleotide is also G. Below it write C because G-C when codons and anticodons pair-up during translation.





In the example, the fourth mRNA nucleotide is C. Below it write G because C-G when codons and anticodons pair-up during translation.



Gene X	
DNA	ACC-GGT-TAT
mRNA	UGG - CCA - AUA
tRNA	ACC - G
Amino	Acids
Trait	

In the example, the fifth mRNA nucleotide is also C. Below it write G because C-G when codons and anticodons pair-up during translation.



Gene X	
DNA	ACC-GGT-TAT
mRNA	UGG - CCA - AUA
tRNA	ACC - GG
Amino	Acids
Trait	

In the example, the sixth mRNA nucleotide is A. Below it write U because A-U when codons and anticodons pair-up during translation.



Gene X	
DNA	ACC-GGT-TAT
mRNA	UGG - CCA - AUA
tRNA	ACC - GGU
Amino	Acids
Trait	

In the example, the seventh mRNA nucleotide is also A. Below it write U because A-U when codons and anticodons pair-up during translation.



Gene X	
DNA	ACC-GGT-TAT
mRNA	UGG - CCA - AUA
tRNA	ACC - GGU - U
Amino	Acids
Trait	

In the example, the eighth mRNA nucleotide is U. Below it write A because U-A when codons and anticodons pair-up during translation.



-	
Gene X	· · · · · · · · · · · · · · · · · · ·
DNA	ACC-GGT-TAT
mRNA	UGG - CCA - AUA
tRNA	ACC - GGU - UA
Amino	Acids
Trait	

In the example, the ninth mRNA nucleotide is A. Below it write U because A-U when codons and anticodons pair-up during translation.

You have now identified the three tRNA anti-codons for the example Gene X



Example:

Gene X DNA ACC-GGT-TAT mRNA UGG - CCA - AUA tRNA ACC - GGU - UAU Amino Acids Trait

Key to CHNOPS	Figure 1	In this stop, you will be identifying the Amine A aid that
tRNA Triplet	Amino Acid Number	in uns step, you will be identifying the Amino Acid that is carried by each of the tRNA Anti-Codons (triplets) that
CCC	1	you have identified for Gene X
CGA	2	you have identified for Gene X
CGC	3	The first anti-codon (triplet) is ACC. Look at the chart
AAC	4	on the left and find the tRNA triplet that matches and
GGG	5	write down the Amino Acid Number associated with it.
AUC	6	
AGG	7	ACC = 20
AAA	8	
UUU	9	
CUA	10	
GGA	11	Example:
GGU	12	
UAU	13	Gene X
AGU	14	
UAC	15	DNA ACC-GGI-TAT
AGC	16	mrna ligg - cca - alia
UAG	17	
GAG	18	trna ACC - GGU - UAU
AUA	19	
ACC	20	Amino Acids 20
		Trait





	Figure 2	
Animo Acids	Trait	
11-2-3	Big Head	
11-3-2	Blue	
13-15-10	Fangs	
16-2	Four Legs	
20-11-13	Hairless	
20-12-13	Hairy	
6-8-10	Horns	
3-2-1	Little Head	
10-9-4	Long Neck	
12-7-8-1	Long Nose	
20-1-6	No Fangs	
6-6-14	No Horns	
9-15-14	No Toes	
9-8	Not Spotted	
11-3-3	Orange	
10-19-7-6	Plump	
16-19-2-4	Red Ears	
10-4-9	Short Neck	
5-7-8-1	Short Nose	
13-14-15	Skinny	
9-4	Spotted	
14-18-17	Toes	
20-7-8-1	Two Legs	
1 4 7 1 4 1 7	Vollow Fore	

The last step in the process of translation is to identify the trait that the amino acid sequence codes for.

In the example, the amino acid code is 20-12-13 Look at the chart on the left and find the code. Write down the trait that is associated with that code.

20-12-13 = Hairy



Now that you have completed an example of how to solve for a gene, follow the same steps to <u>complete all</u> <u>12 genes</u> that are for your specific subject #.

Once you have completed all 12 genes, <u>draw a picture</u> of what you think your organism looks like.

Turn in both your Data Table and Your Drawing to Mr. Haug

On the next pages are some examples of past CHNOPS characters that were created from 1 of the 6 different subjects. Data Table



Gene A	Gene B	Gene C	
DNA ACC-GGT-TAT	DNA ACC-AGG-AAA-CCC	DNA TAT-AGT-TAC	
mRNA	mRNA	mRNA	
tRNA	tRNA	tRNA	
Amino Acids	Amino Acids	Amino Acids	
Trait	Trait	Trait	
Gene D	Gene E	Gene F	
DNA GGT-AGG-AAA-CCC	DNA TTT-AAC	DNA GGA-CGC-CGA	
mRNA	mRNA	mRNA	
tRNA	tRNA	tRNA	
Amino Acids	Amino Acids	Amino Acids	
Trait	Trait	Trait	
Gene G	Gene H	Gene I	
DNA ATC-AAA-CTA	DNA CTA-TTT-AAC	DNA AGT-GAG-TAG	
mRNA	mRNA	mRNA	
tRNA	tRNA	tRNA	
Amino Acids	Amino Acids	Amino Acids	
Trait	Trait	Trait	
Gene J	Gene K	Gene L	
DNA AGC-ATA-CGA-AAC	DNA GGA-CGA-CGC	DNA TAT-TAC-CTA	
mRNA	mRNA	mRNA	
tRNA	tRNA	tRNA	
Amino Acids	Amino Acids	Amino Acids	
Trait	Trait	Trait	

CHNOPS

Gallery













Plump Long nose spotted orange No horns Long neck toes yellow ears Little head no fangs

Aairy

four legs











Key to CHNOPS	Figure 1
tRNA Triplet	Amino Acid Number
CCC	1
CGA	2
CGC	3
AAC	4
GGG	5
AUC	6
AGG	7
AAA	8
UUU	9
CUA	10
GGA	11
GGU	12
UAU	13
AGU	14
UAC	15
AGC	16
UAG	17
GAG	18
AUA	19
ACC	20

Base Pairing Rules for DNA and RNA			
DN/	4 n	nRNA	tRNA
A	> l	J	-> A
Т	> <i> </i>	۹	-> U
С	> ()	> C
G	> (> G

Example:

Gene >	K					
DNA	ACC-G	GT-TA	Т			
mRNA	UGG	-CCA	<u> </u>	AUA		
tRNA	ACC	-GGU	J_1	UAU		
Amino	Acids	20	-	12 -	13	
Trait			Η	AIRY		

		Figure 2
	Animo Acids	Trait
	11-2-3	Big Head
	11-3-2	Blue
	13-15-10	Fangs
	16-2	Four Legs
	20-11-13	Hairless
	20-12-13	Hairy
	6-8-10	Horns
	3-2-1	Little Head
	10-9-4	Long Neck
	12-7-8-1	Long Nose
	20-1-6	No Fangs
	6-6-14	No Horns
	9-15-14	No Toes
	9-8	Not Spotted
	11-3-3	Orange
	10-19-7-6	Plump
	16-19-2-4	Red Ears
	10-4-9	Short Neck
	5-7-8-1	Short Nose
	13-14-15	Skinny
	9-4	Spotted
	14-18-17	Toes
	20-7-8-1	Two Legs
ļ	14-7-14-12	Yellow Ears