

MAKING YOUR CHNOPS!

Pre-Lab Information:

Using your knowledge of Transcription and Translation you are going to make your own creature☺
You will simulate the process of protein synthesis and will determine the traits of your very own CHNOPS! CHNOPS, whose cells contain only one chromosome, are members of the kingdom Animalia. A CHNOPS chromosome is made up of six genes (A, B, C, D, E, and F), each of which is responsible for a certain trait. Your job is to transcribe your CHNOPS DNA and then translate it into the correct amino acid sequence to find out the traits of your CHNOPS. Good Luck!

Materials:

- Colored Pencils
- Instructions
- 1 Data Table (A,B or C)

Procedure:

1. To determine the trait for Gene A of your CHNOPS, fill in the information in the box labeled Gene A in the Data Table. Notice the sequence of nucleotides in DNA. On the line provided, write the sequence of mRNA that is complementary to the DNA.
2. In order to determine the sequence of amino acids, match each mRNA triplet with the specific amino acid in Figure 1. Using a – (hyphen) to separate each amino acid number, record this information in the appropriate place in the Data Table.
3. Using Figure 2, find the trait that matches the amino acid sequence. Record this information in the appropriate place in the Data Table.
4. Repeat steps 1 through 3 for the remaining genes (B through F).
5. Using all the inherited traits, sketch your CHNOPS in the space provided below the Data Table.

Figure 1

mRNA Triplet	Amino Acid Number
ACC	20
AGC	16
CGA	2
AAC	4
CGC	3
GGG	5
AGG	7
AAA	8
UUU	9
GGU	12
UAU	13
CCC	1
AUC	6
CUA	10
GGA	11
UGU	14
AGU	15
CCG	21

Figure 2

Amino Acid Sequence	Trait
20-11-13	Hairless
20-12-13	Hairy
20-21-21	Plump
13-14-15	Skinny
16-2	Four-legged
16-5	Three-legged
12-7-8-1	Long nose
5-7-8-1	Short nose
9-8	No freckles
9-4	Freckles
11-3-2	Blue skin
11-3-3	Orange skin
11-3-4	Pink skin
6-6-10	Male
6-6-14	female

DATA TABLE A:

Gene A	Gene B	Gene C
DNA TGG CCA ATA mRNA _____ Amino Acid Seq. _____ Trait _____	DNA TCG GCT mRNA _____ Amino Acid Seq. _____ Trait _____	DNA AAA TTG mRNA _____ Amino Acid Seq. _____ Trait _____
Gene D	Gene E	Gene F
DNA CCT GCG GCT mRNA _____ Amino Acid Seq. _____ Trait _____	DNA CCC TCC TTT GGG mRNA _____ Amino Acid Seq. _____ Trait _____	DNA TAG TAG GAT mRNA _____ Amino Acid Seq. _____ Trait _____

DATA TABLE B:

Gene A	Gene B	Gene C
DNA TGG CCT ATA	DNA TCG CCC	DNA ATA ACA TCA
mRNA _____	mRNA _____	mRNA _____
Amino Acid Seq. _____	Amino Acid Seq. _____	Amino Acid Seq. _____
Trait _____	Trait _____	Trait _____
Gene D	Gene E	Gene F
DNA CCT GCG GCG	DNA CCA TCC TTT GGG	DNA TAG TAG ACA
mRNA _____	mRNA _____	mRNA _____
Amino Acid Seq. _____	Amino Acid Seq. _____	Amino Acid Seq. _____
Trait _____	Trait _____	Trait _____

DATA TABLE C:

Gene A	Gene B	Gene C
DNA TGG CCA ATA	DNA TCG CCC	DNA TGG GGC GGC
mRNA _____	mRNA _____	mRNA _____
Amino Acid Seq. _____	Amino Acid Seq. _____	Amino Acid Seq. _____
Trait _____	Trait _____	Trait _____
Gene D	Gene E	Gene F
DNA CCT GCG TTG	DNA CCA TCC TTT GGG	DNA TAG TAG ACA
mRNA _____	mRNA _____	mRNA _____
Amino Acid Seq. _____	Amino Acid Seq. _____	Amino Acid Seq. _____
Trait _____	Trait _____	Trait _____

1. Distinguish between transcription and translation:

2. Where in the cell does transcription and translation happen?

3. Suppose you knew the make-up of specific proteins in a cell. How would you determine the particular DNA code that coded for them?

4. How could one change in a DNA nucleotide alter the formation of the translated protein? (An example would be the difference between normal and sickle-cell hemoglobin.)

5. Create two NEW & ORIGINAL traits for your CHNOPS and give their initial DNA sequence and mRNA codons. Include the resulting amino acid sequence.
