



Alien Encounters!

Background: In the year 2050, an incredible archeological discovery was made in the middle of a remote area of South America. It was an area where a large meteor had struck Earth. A pile of alien bones were found completely mixed up together. The explorers who made the discovery immediately informed the organization known as Scientific Phenomena Over Our Fabulous Sphere (SPOOFS). SPOOFS sent out their best scientists to collect DNA samples. The scientists were able to recover small fragments of DNA, which were brought back to the scientists' labs. After much work, the scientists determined that the DNA fragments represented 9 different genes.

Purpose: In this activity, you will determine the traits of these unfortunate recovered aliens by analyzing their DNA and determining the amino acid sequences of the resulting small protein fragments. Each fragment is associated with a particular gene and a specific alien characteristic (trait).

Procedure:

1. Put the DNA sequence for each gene in the proper location on your data sheet.
2. Transcribe the DNA for each gene into mRNA. Record those sequences.
3. Translate the mRNA into amino acids using the provided mRNA Codon Chart. Record the amino acid sequence for each gene.
4. Use the "Alien Genes" chart to determine the traits that are associated with each of your amino acids sequences and write those traits on the charts.
5. Using a blank piece of paper, sketch and color your alien, making sure to include all relevant (known) traits (you can add other unknown traits as well, if you wish). Be sure to include your alien's genus and species at the top of your drawing and data sheet. Place your name on your drawing. (NOTE: The genus name must be capitalized and the species name always starts with a lower case letter.)
6. Answer the following questions on the back of your alien picture:

Questions:

- A. Did you find any "identical" aliens in your group?
- B. Give the tRNA sequences for Gene D.
- C. How does a single change in a nitrogen base alter the formation of a resulting protein?
- D. If you knew a particular amino acid sequence, could you figure out the DNA for that sequence? Why or why not?
- E. What is the difference between transcription and translation?
- F. What are the roles of the DNA, the mRNA, the rRNA, and tRNA in protein synthesis?

mRNA CODON CHART

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

Third letter

DATA

Tables for Alien Gene Analysis:

NAME _____

Alien Number _____ Alien Genus and species _____

Is your alien hairless or hairy?

GENE A	
DNA	
mRNA	
Amino Acids	
Trait	

Is your alien fat or skinny?

GENE B	
DNA	
mRNA	
Amino Acids	
Trait	

Does your alien have 4 legs or 8 legs?

GENE C	
DNA	
mRNA	
Amino Acids	
Trait	

What size nose does your alien have?

GENE D	
DNA	
mRNA	
Amino Acids	
Trait	

Does your alien have antennae or not?

GENE E	
DNA	
mRNA	
Amino Acids	
Trait	

What color skin does your alien have?

GENE F	
DNA	
mRNA	
Amino Acids	
Trait	

How many fingers does your alien have?

GENE G	
DNA	
mRNA	
Amino Acids	
Trait	

Does your alien have a tail?

GENE H	
DNA	
mRNA	
Amino Acids	
Trait	

Does your alien have 4 eyes or 8 eyes?

GENE I	
DNA	
mRNA	
Amino Acids	
Trait	

ALIEN GENES

This table shows the amino acid sequences for the various alien genes and traits.

Gene Letter	Amino Acid Sequence	Resulting Characteristic
A	Val-pro-ileu	Hairless
	Tryp-pro-ileu	Hairy
B	Tryp-val-val	fat
	Ileu-ileu-ser	skinny
C	Ser-ala	4 legs
	Ser-ser	8 legs
D	Pro-ser-phe-gly	Long nose
	Gln-ser-phe-gly	Short nose
E	Lys-phe	No antennae
	Lys-leu	4 antennae
F	Pro-ala-ala	Blue skin
	Pro-ala-asp	Red skin
	Pro-ala-val	Yellow skin
	Pro-ala-pro	Green skin
G	Gln-gln-asp	10 fingers
	Gln-gln-lys	12 fingers
H	Gly-gly-ileu	tail
	Ala-gly-ileu	No tail
I	Ileu-asp-ala	4 eyes
	Ser-asp-ala	8 eyes

Recovered Sequences = Alien Species #1

GENE A: C A A G G A T A T

GENE B: A C C C A A C A A

GENE C: A G C A G G

GENE D: G T C A G G A A A C C C

GENE E: T T T A A A

GENE F: G G A C G C C G A

GENE G: G T C G T C C T A

GENE H: C G C C C C T A T

GENE I: T A T C T A C G C

Recovered Sequences = Alien Species #2

GENE A: ACCGGTTAT

GENE B: ACCCAACAA

GENE C: AGCAGG

GENE D: GGTAGGAAACC

GENE E: TTTAAA

GENE F: GGACGCGGG

GENE G: GTCGTCTTT

GENE H: CGCCCCTAT

GENE I: AGCCTACGC