

Name _____

Period _____

Protein Synthesis in Tribbles

Background:

Genes are the units that determine inherited characteristics such as hair color and blood type. Genes are segments of DNA molecules that determine the structure of polypeptides (proteins). The sequence of nucleotides (nitrogen bases) in DNA determines the sequence of amino acids in polypeptides, and thus the structure of proteins.

Procedure:

1. Complete data table 1 by filling in the correct codons and anticodons.
2. Match the codon found on the mRNA to the amino acid number found in Table 2.
3. Read the sequence of amino acids to determine the trait on table 3.
4. Draw your Tribble.

Table 1

Gene A DNA ACCGGTTAT mRNA _____ tRNA _____ amino acid sequence _____ trait _____	Gene B DNA AGCCGA mRNA _____ tRNA _____ amino acid sequence _____ trait _____	Gene C DNA TTTAAC mRNA _____ tRNA _____ amino acid sequence _____ trait _____
Gene D DNA GGTAGGAAACCC mRNA _____ tRNA _____ amino acid sequence _____ trait _____	Gene E DNA GGACGCCGA mRNA _____ tRNA _____ amino acid sequence _____ trait _____	Gene F DNA ATCATCCTA mRNA _____ tRNA _____ amino acid sequence _____ trait _____

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Table 2

mRNA codon	amino acid number
UGG	20
UCG	16
GCU	2
UUG	4
GCG	3
CCC	5
UCC	7
UUU	8
CCA	12
AUA	13
GGG	1
UAG	6
GAU	10
CCU	11
AAA	9

Table 3

amino acid sequence	trait
20-11-13	hairless
20-12-13	hairy
20-21-21	plump
13-14-15	skinny
16-2	four-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
6-6-10	male
6-6-14	female
7-7-7	child
7-6-9	old

Analysis Questions:

- Distinguish between transcription and translation, where do they occur what RNA molecules are involved with the processes? In detail *8 points*
- How many nitrogen bases make up a codon? *2 points*
- What is the difference between a codon and an anticodon, where do you find each? *4 points*
- What molecule carries the amino acids in the cytoplasm? *2 points*
- In what ways do DNA and RNA molecules differ? List all of them *6 points*
- What is the role of DNA in protein synthesis? *3 points*

Conclusion:

- Suppose you knew the makeup of a specific protein in a cell. How would you determine the particular DNA code that coded for them? *4 points*
- Mutations, changes in the genetic code, can be harmful or beneficial. What effect could one amino acid out of sequence cause? How could this lead to variation within a species? *5 points*