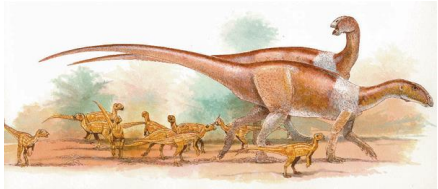
Name _____

Dino TNT: Transcription -N- Translation (GENETICS15)

An "EXPLOSIVE" **protein**-making experience`

Objectives: Students will Transcribe each dinosaur DNA gene code into a strand of mRNA, remove **INTRONS** if necessary, and then Translate the mRNA to determine the dinosaur protein chain and its FUNCTION. Finally, students will evaluate the effects of various DNA **mutations** on the dinosaur proteins produced.

Directions: (Build a Dino Protein)

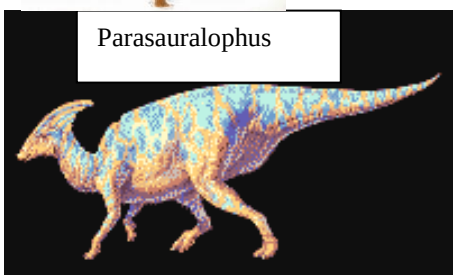


1. You have just received 4 "top-secret" dinosaur DNA codes. First TRANSCRIBE (recopy) the DNA gene code into a single mRNA strand.
2. Inspect the mRNA code and remove any INTRONS → RNA Intron = **UCGUGU**
3. Identify each 3-letter CODON in the mRNA strand with parentheses( ).
4. Next, TRANSLATE (switch languages) from mRNA language to the "Protein Language" by using the mRNA CODON TABLE below to convert each CODON to its corresponding Amino Acid.
5. Continue until you have linked the amino acids to discover all 4 dinosaur protein chains.
6. Then, check your work by finding each dinosaur protein chain on the Dino Protein Guide (@ back of the room) and write down the FUNCTION for each dinosaur protein.

Directions: (Mutation Analysis)

7. First, compare each letter of the mutated dinosaur gene code (Inside black rectangle) to the original gene code (Above black rectangle) and identify (CIRCLE) which **type of point mutation** has occurred. Finally, evaluate the impact of that mutation on your dinosaur protein's **STRUCTURE** and **FUNCTION**.

Parasauralophus



CODON Table →

Codons in mRNA

First base	Second base: U	C	A	G	Third base
U	UUU, UUC Phenylalanine; UUA, UUG Leucine	UCU, UCC, UCA, UCG Serine	UAU, UAC Tyrosine; UAA, UAG Stop	UGU, UGC Cysteine; UGA Stop; UGG Tryptophan	U, C, A, G
C	CUU, CUC, CUA, CUG Leucine	CCU, CCC, CCA, CCG Proline	CAU, CAC Histidine; CAA, CAG Glutamine **Gln**	CGU, CGC, CGA, CGG Arginine	U, C, A, G
A	AUU, AUC Isoleucine; AUA; AUG **Met**	ACU, ACC, ACA, ACG Threonine	AAU, AAC Asparagine **Aln**; AAA, AAG Lysine	AGU, AGC Serine; AGA, AGG Arginine	U, C, A, G
G	GUU, GUC, GUA, GUG Valine	GCU, GCC, GCA, GCG Alanine	GAU, GAC Aspartic Acid; GAA, GAG Glutamic Acid	GGU, GGC, GGA, GGG Glycine	U, C, A, G

Dino DNA Gene code: TTATCCAGCACATCGTGGTTGTTTATT ← (original gene)

mRNA strand (CODONS): _____

Dino Protein Chain: _____

Dino Protein FUNCTION: _____

Identify (with a vertical **arrow)** the location of each mutation and then **CIRCLE** which type of point mutation you found in your dinosaur DNA gene (below) after it was exposed to **x-ray radiation**: : (substitution, addition, deletion)

Mutated Dino DNA code: TTATCAAGCACATCGTGCTTGTTTATT ←(Mutated Gene)

Mutated mRNA strand: _____

Mutated Dino Protein: _____

Analyze how the x-ray mutation/s affected the dinosaur protein's **STRUCTURE** and **FUNCTION**

A) Circle any Amino Acids that have changed from the original protein ….. how many AA are different? _____

B) Will the mutated dinosaur protein still function correctly … Explain why or why not?

Dino DNA gene code (4): AGAAGTAGGAGAAGCATAATGATC

mRNA strand (codons): _____

Dino Protein: _____

Dino Protein FUNCTION _____

Identify (with a vertical **arrow)** the location of each mutation and then **CIRCLE** which type of point mutation you found in your dinosaur DNA gene (below) after it was exposed to **x-ray radiation**: : (substitution, addition, deletion)

Mutated Dino DNA code: AGAAGTATGGAGAAGCATAATGATC ←(Mutated Gene)

Mutated mRNA strand: _____

Mutated Dino Protein: _____

Analyze how the x-ray mutation/s affected the dinosaur protein's **STRUCTURE** and **FUNCTION**

A) Circle any Amino Acids that have changed from the original protein ….. how many AA are different? _____

B) Will the mutated dinosaur protein still function correctly … Explain why or why not?

Dino DNA Gene code (11): GCTCCGAGCACAAGAGGAGGCAGAGGGATT

mRNA strand (CODONS) _____

Dino Protein Chain: _____

Dino Protein FUNCTION: _____

Identify (with a vertical **arrow)** the location of each mutation and then **CIRCLE** which type of point mutation you found in your dinosaur DNA gene (below) after it was exposed to **(UV) Ultraviolet radiation**: : (substitution, addition, deletion)

Mutated Dino DNA code: GCTCCGAGCACAAGGGGAGGCAGAGGTATT ←(Mutated Gene)

Mutated mRNA strand: _____

Mutated Dino Protein: _____

Analyze how the UV mutation/s affected the dinosaur protein's **STRUCTURE** and **FUNCTION**

A) Circle any Amino Acids that have changed from the original protein ….. how many AA are different? _____

B) Will the mutated dinosaur protein still function correctly … Explain why or why not?

Dino Gene Code (16): ATAGATCTGCTTAGCACACCGAGAAGCATC

mRNA strand (CODONS): _____

Dino Protein Chain: _____

Dino Protein FUNCTION: _____

Identify (with a vertical **arrow)** the location of each mutation and then **CIRCLE** which type of point mutation you found in your dinosaur DNA gene (below) after it was exposed to a **strong herbicide:** : (substitution, addition, deletion)

Mutated Dino DNA code: ATAGATCTGCTTAGCACACCGAGAGCATC ←(Mutated Gene)

Mutated mRNA strand: _____

Mutated Dino Protein: _____

Analyze how the herbicide mutation/s affected the dinosaur protein's **STRUCTURE** and **FUNCTION**

A) Circle any Amino Acids that have changed from the original protein ….. how many AA are different? _____

B) Will the mutated dinosaur protein still function correctly … Explain why or why not?