

Dino TNT: Transcription -N- Translation -N- Mutation

Objectives: Students will Transcribe each dinosaur DNA gene code into a strand of mRNA 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. Identify each 3-letter **CODON** in the mRNA strand with parentheses ().
3. 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.
4. Continue until you have linked the amino acids to discover all 4 dinosaur protein chains.
5. 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.

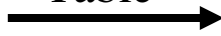


Directions: (Mutation Analysis)

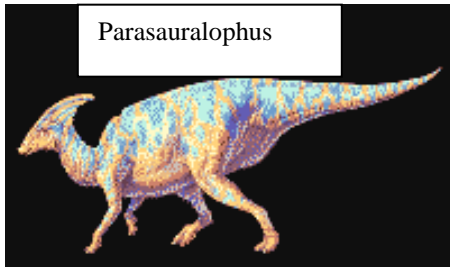
6. First, compare each letter of the mutated dinosaur gene code (Inside black rectangle) to the original gene code (Above black rectangle) and identify (**CIRCLE**) which **type of point mutation** has occurred. Finally, evaluate the impact of that mutation on your dinosaur protein’s **STRUCTURE** and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



CODON Table



Codons in mRNA																									
First base	Second base									Third base															
	U			C			A				G														
U	UUU	Leucine	UCU	Serine	UAU	Tyrosine	UGU	Cysteine	U	UUC	UCC	UCA	UGC	C	UUA	UCA	UAA	UGA	A	UUG	UCG	UAG	UGG	G	
	C		CUU		CCU		CAU		CGU	U	CUC	CCC	CAC	CGC	C	CUA	CCG	CAA	CGA	A	CUG	CCG	CAG	CGG	G
	A		AUU		ACU		AAU		AGU	U	AUC	ACC	AAC	AGC	C	AUA	ACA	AAA	AGA	A	AUG	ACG	AAG	AGG	G
	G		GUU		GCU		GAU		GGU	U	GUC	GCC	GAC	GGC	C	GUA	GCA	GAA	GGA	A	GUG	GCG	GAG	GGG	G



Dino DNA Gene code: **TTATCCTCGTGGTTGTTTATT** ← (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: **TTATCATCGTGCTTGTATT** ← (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): GCTCCGAGAGGAGGCAGAGGGATT
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: GCTCCGAGGGGAGGCAGAGGTATT ← (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 Gene Code (16): ATAGATCTGCTTCCGAGAAGCATC
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: ATAGATCTGCTTCCGAGAGCATC ← (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?