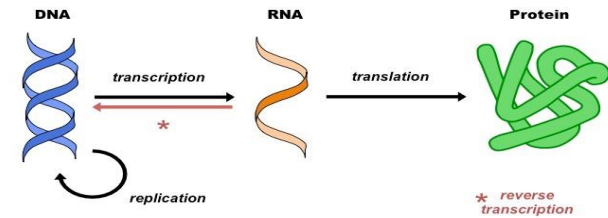
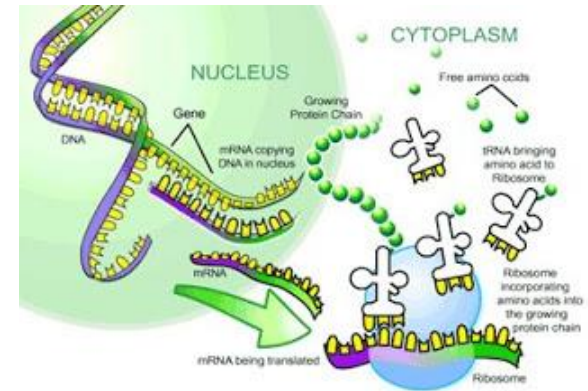


## Unit 8: Protein Synthesis

*Fold along the line and glue this side down in your Biology Interactive Learning Log (BILL)*

**Learning goals:** How does information flow from DNA to RNA to direct the synthesis of proteins? We know DNA is the genetic material, and we know that the sequence of nucleotide bases in its strands must carry some sort of code. For that code to work, the cell must be able to understand it. Sometimes a few of those coded letters are changed accidentally, altering the message. In this unit, we will discover what the bases code for and how the cell's decoding system works, and what happens when changes on genes effect the polypeptides for which they code.



### Key concepts:

RNA  
transcription

introns & exons  
translation

Central Dogma of Biology  
mutations

natural selection

### Essential Questions:

1. How does RNA differ from DNA?
2. How does the cell make RNA?
3. What is the genetic code, and how is it read/decoded?
4. What role does the ribosome play in assembling proteins?
5. What is the "Central Dogma of Molecular Biology"?
6. What are mutations and how do they affect genes and proteins?
7. How can DNA mutations result in positive or negative phenotypic adaptations that result in natural selection and species evolution?

Can you show what you know?

# Vocabulary:

(+) = Can explain it; (-) = Only heard it; 0 = No idea

Term	Pre	Post	Memory Clue
1. Central Dogma of Biology			
2. RNA			
3. messenger RNA			
4. ribosomal RNA			
5. transfer RNA			
6. transcription			
7. RNA polymerase			
8. promoters			
9. intron			
10. exon			
11. Sense strand of DNA			
12. Antisense strand of DNA			
13. bioinformatics (pg 407)			
14. Human Genome Project (pg 406-409)			
15. polypeptide			
16. translation			
17. anticodon			
18. gene expression			
19. mutation			
20. point mutation			
22. frameshift mutation			
23. mutagens			
24. natural selection (pg 463)			
25. evolution			
26. adaptation			
27. sickle cell disease (pg 398-400)			
28. cystic fibrosis(pg 399)			

## Learning Goals –

**What I Need to Know/Be able to do:**

- A. **Compare and contrast** RNA and DNA in terms of structure and function.
- B. **List** several functions of proteins in living cells.
- C. **Sketch** and **label** an RNA nucleotide.
- D. **Identify** the 3 main types of RNA.
- E. **Identify** the 4 nitrogen bases in RNA.
- F. **Identify** the Sense and Antisense strands of DNA.
- G. **Explain** the relationship between DNA, RNA proteins, and amino acids.
- H. **Compare and contrast** introns and exons, and **describe** how they are related to a gene.
- I. **Explain** the purpose of the enzyme RNA polymerase.
- J. **Describe** the steps in the process of transcribing DNA into mRNA.
- K. **Compare** a codon to an anticodon.
- L. **Demonstrate** the ability to translate DNA codons into mRNA, tRNA, and then amino acid sequences using 2 different types of mRNA translator charts.
- M. **Sequence** the steps in the process of translation.
- N. **Infer** how the synthesis of proteins controls an organism's phenotype. **Give** an example.
- O. **Compare and contrast** replication and protein synthesis.
- P. **Describe** the purpose of the Human Genome Project, its major discoveries and its importance.
- Q. **Compare** point mutations and frameshift mutations.
- R. **Compare** gene and chromosomal mutations. **Give** examples of each.
- S. **Relate** mutations to natural selection and evolution of species. (positive vs. negative phenotypic adaptations)
- T. **Compare** the similarity of human DNA to that of other organisms, and **describe** how it relates to evolution.